

Report to

# Washington State Ferries Revenue Collection System

## Conceptual System Design

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Deliverable 4 of 6

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## APPROVALS

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# 1. CONCEPTUAL DESIGN SUMMARY

WSF's Revenue Collection System (RCS) will meet the Washington State Ferries (WSF) business requirements through the acquisition of commercially available software packages and vendor independent technology, and through limited customization following modern software design.

WSF's strategy is to implement RCS using commercial off-the-shelf hardware and software components. The RCS software must be designed and be modifiable using modern, component-based software design. This combination of commercial hardware and modern, component-based software design, will allow WSF to replace its aging POS system, and establish audit and financial controls on a stable platform able to support WSF's long-term vision for Revenue Collection.

In the future, the RCS will be able to automate sales and redemption activities and to integrate with state-of-the-art technologies, such as the Regional Fare Coordination System Smart Card and the Tacoma Narrows Bridge vehicle transponder systems.

WSF plans to design and implement RCS, focusing on providing the maximum flexibility and longevity possible. This approach will enable WSF to evolve its business practices to meet changing needs, adopt new sales and redemption technologies, and to address a future vision of fully automated sales and redemption, while reducing RCS's total cost of ownership.

Features of the RCS implementation will include:

- **Vendor independence.** Standards-based technology that utilizes commercially available computer and networking hardware, point-of-sale devices, operating systems and applications software, will reduce the dependency on any single vendor for hardware or software.
- **3-Tier Processing.** Sales, redemption, accounting and reporting functions will be distributed across multiple locations and system devices, each connected to the Washington State Ferries wide-area network.
- **High availability.** Each component in the RCS will implement elements of fault tolerance and high availability.

The RCS will represent an integrated revenue collection and reporting system that addresses WSF's needs for revenue collection, internal controls and management information needs—as identified in the *Report to Washington State Ferries Revenue Collection System Current System Assessment*.

The RCS will replace aging point-of-sales technology and combine all revenue transactions into one integrated application. The RCS will also provide the sales and revenue collection foundation for integrating WSF with the Regional Fare Coordination System (RFCS) and the Tacoma Narrows Bridge toll collection system. Additionally, the intent is for the system to use commercially available software to implement sales and revenue management system.

Key features of the RCS include:

- **Single integrates system for all WSF revenue transactions.** The new RCS will combine all revenue transactions into one integrated application for processing, reconciliation and reporting.
- **Customizable and reliable point-of-sales revenue collection.** The RCS will use standard point of sales devices to accept payments, redeem passes and report sales. The RCS point-of-sale devices will function independently of WSF's network and continue to collect fares during network outages.
- **Self-Service.** The RCS will provide facilities for customer self-service, moving sales of passes and single-fares away from the terminal to customer convenient sales kiosks, and the Web.
- **Automated Redemption.** The RCS will provide facilities for automated redemption of passes at passenger walk-on boarding points using turnstiles for example at some locations, in addition to vehicle and face counting technologies for redemption confirmation.
- **RFC Smart Cards.** The RCS will provide an interface for the integration with the future Regional Fare Coordination (Smart Card) system.
- **Internal Controls.** The RCS will provide adequate controls to record all sales, reflect a definitive redemption point, and require confirmation of redemption using automated and manual counting mechanisms.
- **Web Sales and Reservations.** The RCS will provide features for Web ticket, pass, and permit sales; make reservations and provide real-time space availability information.
- **Interfaces with existing TRAINS G/L system.** The RCS will use commercial middleware systems to maintain and automatically post journal entries to the Financial Management System (FMS) and TRAINS general ledger system.
- **Vessel Manifesting.** The RCS will provide functionality for maintaining real-time vessel manifests, sailing statistics and boarding control. As a result, sellers, attendants, and customers will know how many passenger and vehicle spaces remain available on any given sailing. Additionally, the RCS will provide features for managing passenger manifests for international sailings, and therefore support post 9/11 security requirements.
- **Debit Cards.** The RCS will provide mechanisms to support debit card payment processing.
- **Interfaces for future sales and redemptions.** The RCS will provide interfaces for processing sales and redemptions, using future technologies such as the Tacoma Narrows Bridge toll transponder.
- **Security.** The RCS will offer security to control and track access to customer information, and provide auditing tools to track changes to the data. All changes to information will be logged and critical customer information will be encrypted to safeguard against disclosure.

## 2. INTRODUCTION

### 2.1. Purpose

The purpose of this document is to describe a conceptual design for the Washington State Ferries Revenue Collection System.

The Conceptual Design represents a mixture of business requirements and processes, the needs of the user community, and the functions that the system will perform. The document describes:

- The system context, which describes the relationship of this system to other systems
- The interfaces between all associated systems
- The mechanisms and devices used by the system
- The processes and functions performed by the system

### 2.2. Scope

The scope of the document covers conceptual design of the Revenue Collection System and its potential interfaces with existing Washington State Ferries and Washington State Department of Transportation (WSDOT) systems. As such, it provides a design that implements WSF's RCS requirements, without committing to specific technologies or products.

### 3. DIRECTION SETTING

#### 3.1. Introduction

The following section captures a high level, long-term vision for the Revenue Collection System.

#### 3.2. Project Objectives

As quoted below, WSF's RCS project charter describes the RCS Project as follows:

*"The Revenue Collection System has six primary objectives and a number of supporting components, all are listed below:*

- 1. Define and document the business processes and requirements for the new system while assuring alignment with customer needs, expectations, and maximize business efficiencies*
- 2. Improve revenue controls and ability to audit the revenue system*
- 3. Replace the aging POS, back office accounting, attendant interfaces/applications and integrate all revenue collection points into an integrated system*
- 4. Integrate with Regional Fare Coordination System (RFCS) project*
- 5. Include contract San Juan Island and Sidney B.C. revenue collection and reporting in the new automated system*
- 6. In anticipation of adoption of new tariff regulatory changes by the Transportation Commission, develop alternatives, recommend, and implement approved revenue collection system initiatives, such as expansion of monthly passes, and period pricing of fares."*

*"The components and general requirements of the Revenue Collection project are:*

- Develop an integrated turn key electronic system encompassing hardware, software, and supporting multiple methods of payment at toll booths and off premise locations*
- Minimize the impact to transaction processing time at the tollbooth. Transaction processing will not change how early a customer must arrive at a terminal in order to make the sailing*
- The system will incorporate and support established seller performance measures, policy and procedures*
- Develop a computer application that will support the evolution from the existing fare collection and control environment to the new system. Implementation of the new RCS must support a phased rollout strategy*
- Assure continued consolidated financial and traffic reporting, as well as improved/real time executive and management reports*
- Develop an application that will operate in WSF's information technology including client server and local area networks*

- *Include comprehensive documented fare collection and control policies and operational procedures*
- *Develop and document opportunities for current and future improved vessel load statistics*
- *Develop and document current and future system requirements for integrating Preferential Loading and Reservations*
- *Assure a smooth system transition, with an emphasis on training and on-going support*

*“The new Revenue Collection System should solve several problems the current POS system does not address. First, tighter controls on revenues will be implemented, ensuring all revenues are both collected and recorded, improving audit ability and control. Secondly, when possible, move the point of purchase out of the tollbooths to the WEB, Kiosks, retail facilities, possibly ATM and vending machines, which are more convenient for our customers. Third, replace the current POS system with a fully integrated Revenue Collection System, which will also integrate with the Regional Fare Coordination Project. Fourth, integrate the San Juan Islands and Sidney BC revenue collection and reporting into the new Revenue Collection System. Fifth, assume early implementation of RCS program improvements within the current POS system that will be integrated into new RCS such as web sales expansion, and period pricing strategies for fares. The adoption of new technologies for analyzing data and providing improved management controls will allow WSF to respond to changes that impact WSF ability to deliver a quality product.”*

### **3.2.1. Business Processes**

The key business processes addressed by WSF’s RCS are listed below. Specific processes are documented in the *Washington State Ferries Revenue Collection System Current State Workflows and Narratives* document.

- Collect fares at terminals
- Manage preferential loading and space availability
- Manage vessel manifests and traffic (sailing) statistics
- Manage WSF commercial customer accounts
- Manage WSF revenues
- Manage WSF ticket and pass inventory
- Manage and reconcile WSF revenue from all sources

### **3.2.2. Audit and Internal Controls**

Previous fiscal year audits performed by the Washington State Auditor’s Office have identified a number of deficiencies and opportunities for improvement in WSF’s revenue systems internal controls. The findings of the Washington State Auditor’s Office are outlined below.

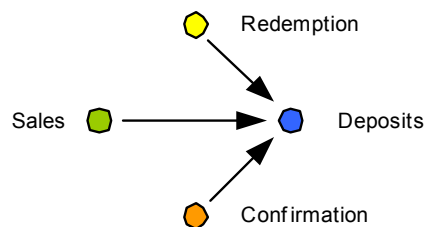
#### **Unrecorded Sales**

There is no provision to ensure that all sales are recorded. Unrecorded sales can occur and monies collected can be misappropriated without timely detection. The existing system does not

have the ability to reconcile sales by seller, or, terminal to passenger and vehicle counts (*Audit Findings 2000, 2001 and 2002*).

The RCS will address this deficiency by

- Recording all sales transactions
- Reconciling sales to redemption
- Improve audit and internal controls, triangulating sales to bank deposits, sales to redemption, and providing automated confirmation of redemption. Sales and redemption or redemption and confirmation may occur at the same time depending on the physical characteristics of the ferry terminal. Confirmation is a count of vehicles and pedestrians boarding a vessel that is independent of sales or redemption.
- Providing automated confirmation of reconciliation using technologies such as vehicle and face counting



*Triangulation compares three values to estimate or test the reasonableness of a fourth value. The three components of the transaction sales, redemption and confirmation can be used to triangulate / reconcile the amount of the bank deposit.*

For example, Colman dock passenger level sales occur either at a self-service kiosk or at tollbooth. Sales redemption occurs as passengers pass through turnstiles. Redemption is then confirmed by counters in the turnstile. In this example, sales are reconciled by redemption and the confirmation count. From analysis of sales, we expect to redeem 20 passengers who purchased passes or tickets off-site. If 100 passenger fares were sold, we expect confirmation of 120 passengers boarding (redemption and confirmation). These numbers, when multiplied by the average fare for a route, predicts the expected bank deposits for all media being deposited via armored car services.

It is difficult to cost effectively prove any audited value with 100% confidence. In the case of unrecorded sales, the Best Practices alternative introduces a confirmation point, after the completion of the sales and redemption activities and outside of the control of WSF staff performing those functions. Manual procedures such as spot checks can prove the accuracy of the confirmation data. Such changes will address the systems weaknesses that currently exist. They will not attempt to resolve the fraudulent manipulation of source transactions. This new data will validate or raise the statistical confidence in the recorded transactions and thereby improve the audit reliance on the reasonableness of recorded sales and tracked redemptions. It will be important for WSF to meet with the State auditors to agree on what is appropriate and “reasonable assurance” for the “Proof” of revenue.

Colman dock vehicle tolls are sold and redeemed simultaneously at the tollbooth. Redemption is confirmed by counting equipment placed on the transfer span as vehicles board. From analysis of sales, we expect 10 vehicles to have pre-paid their fare. In this case, if 100 vehicle tolls were



collected, we expect confirmation of 110 vehicles boarding from direct sales and historical analysis of pre-paid sales. These numbers, when multiplied by the average fare for a route, predicts the expected bank deposits for all media being deposited via armored car services.

Passengers in a vehicle are counted during the redemption process. This count confirms the sales of passenger fares providing a count of passengers for the vessel manifest. The system assumes the number of passengers in vehicles does not change between redemption and boarding.

The metric used by the confirmation equipment must be gathered during the sales or redemption process. For example, if vehicle axles counts are used for confirmation, the sales process must capture the axles of the vehicle during sales/redemption process.

### **Inadequate Media Controls**

Printed media is not adequately controlled, invalidated and reconciled. Media is not reconciled by independent transactions. Sales may be recorded as media sale and the cash misappropriated without detection. There is no independent verification that all coupons or tickets collected are invalidated (*Audit Findings 2000, 2001 and 2002*).

The RCS will address this deficiency by

- Assigning and verifying unique serial numbers to all media
- Voiding media serial numbers during redemption
- Automatically detecting the reuse of voided media
- Reconciling

The Best Practices alternative as proposed by the RCS Project Team, will address the elimination of all printed media and inventory.

### 3.3. Transaction Volumes and Statistics

The following table summarizes daily POS transactions at each of the terminals operated by WSF during 2001.

Terminal	Prepaid			Single-fare		
	Average	High	Low	Average	High	Low
Anacortes	642	1,188	281	2,088	6,363	520
Bainbridge Island	1,667	2,485	682	1,608	2,688	486
Bremerton	1,382	2,658	166	705	1,473	233
Clinton	1,747	2,470	790	1,550	3,061	462
Colman Dock	8,755	14,871	2,391	6,846	14,566	3,056
Edmonds	2,198	3,368	887	4,286	9,919	1,437
Fauntleroy	2,725	3,850	1,061	1,691	4,401	780
Keystone	110	273	15	1,019	2,658	7
Kingston	1,341	1,883	582	2,160	3,740	734
Mukilteo	2,793	3,843	1,196	3,188	7,134	924
Point Defiance	700	1,321	242	442	1,517	125
Port Townsend	143	772	23	1,030	2,694	0
Southworth	619	1,681	214	536	1,217	251
Vashon	365	1,063	5	0	0	0
Total	25,187	41,726	8,535	27,147	61,431	9,015

**Table 1—Daily Transaction Statistics<sup>1</sup>**

Contract Terminals on the San Juan Islands and at Sydney B.C., employee subsidized, or web sales are not included and represent minimal daily volumes.

### 3.4. Terminal Characteristics

WSF terminal facilities range from large terminals, with high activity levels, to small but functional terminals on routes with lower rider ship. Seattle's Colman Dock is WSF's busiest terminal, serving approximately 10.8 million riders and 3.1 million vehicles in 2001. It's main features include three docking slips for auto-passenger ferries and a large off street holding area

for vehicles, with enclosed waiting rooms, overhead loading facilities for walk on passengers and a Passenger Only terminal. In contrast, the terminal facilities at Shaw Island, Tahlequah and Point Defiance have only a single loading ramp, which must be shared by both vehicles and pedestrians, and no formal off street holding lot for vehicles. Other WSF terminal facilities range between these two extremes. WSF Terminal Characteristics Table at the end of Section 3.4 provides more complete characteristics of each terminal.

WSF operates twenty-eight vessels, servicing a large number of routes from twenty terminal locations. Each terminal is unique in its configuration, ability to stage vehicles prior to loading, and type of facilities it offers for selling fares, passes, boarding passengers and vehicles. These characteristics will have a significant impact on the operations of the RCS. The placement of tollbooths, passenger boarding controls, and vessel staging areas restrict options available to WSF to automate sales, redemption, and confirmation processes.

WSF terminals can be grouped by common characteristics for the purposes of describing the likely state for each terminal:

- Group One: Colman Dock, Anacortes, and Edmonds. These share common characteristics of high volume, vehicle staging areas that accommodate staging for a full ferry, overhead loading for walk-on passengers and significant staffing. Automation may be possible at these terminals at the passenger tollbooths levels. Fare determination for vehicle passengers limits the ability to automate vehicle sales and redemption.
- Group Two: Bainbridge, Bremerton, Kingston, and Clinton. These share common characteristics of high volume, vehicle sales only, vehicle staging areas that accommodate staging for a full ferry, overhead loading for walk-on passengers (except Clinton) and significant staffing. Automation is possible at these terminals pre-sold vehicles at the vehicle tollbooths.
- Group Three: Mukilteo and Fauntleroy. These share common characteristics of high volume, limited control over vehicle traffic and vehicle staging areas that lack the capacity to accommodate staging of a full ferry, no overhead loading for walk-on passengers, and significant staffing. Automation may be possible for walk-on passenger traffic at these terminals.
- Group Four: Sidney (International Terminal), Shaw, Lopez, Friday Harbor, Orcas, Tahlequah, Point Defiance, Southworth, Vashon Island, Point Townsend and Keystone. These share common characteristics of low volume and limited staffing.

The Terminals in Group Four, Sidney (International Terminal), Shaw, Lopez, Friday Harbor, Orcas, are managed by contract operators and do not use existing WSF POS or back office systems. Implementing the RCS at these terminals will improve financial accountability, scheduling, boarding controls and sailing statistics. The Sidney, B.C. terminal will benefit by improved passenger manifesting and controls—as required by the Immigration and Naturalization Service, the United States Customs Service and the United States Coast Guard.



### 3.4.1. WSF Terminal Characteristics Table

Terminal	Vehicle Amenities				Pedestrian Amenities					
	Vehicle Tollbooths	Vehicle Holding Capacity	Transfer Primary	Spans Tie UP	Passenger Tollbooths	Over head Loading	Waiting Area	Available Public Transit	Mixed Loading	Contract
<b>Colman Dock</b>	4	650	3	0	4	Y	Y	Metro	N	N
<b>Pier 50 Bremerton/Vashon</b>	0	0	2	0	1	N	Y	Metro	N	N
<b>Bremerton</b>	3	100	2	0	2	Y	Y	Kitsap	N	N
<b>Bainbridge</b>	4	208	2	1	3	Y	Y	Kitsap	N	N
<b>Fauntleroy</b>	2	100	1	0	1	N	Y	Metro	Y	N
<b>Southworth</b>	2	150	1	0	0	N	Y	Kitsap	Y	N
<b>Point Defiance</b>	1	50	1	0	1	N	Y	Pierce	Y	N
<b>Edmonds</b>	4	175	1	0	2	Y	Y	Community	N	N
<b>Kingston</b>	3	290	2	1	0	Y	N	Kitsap	N	N
<b>Mukilteo</b>	3	110	1	0	1	N	Y	Community	Y	N
<b>Clinton</b>	3	100	2	0	0	N	Y	Island	Y	N

## WSF Terminal Characteristics

Table continued

Terminal	Vehicle Amenities				Pedestrian Amenities					
	Vehicle Tollbooths	Vehicle Holding Capacity	Transfer Primary	Spans Tie UP	Passenger Tollbooths	Over head Loading	Waiting Area	Available Public Transit	Mixed Loading	Contract
Port Townsend	2	110	1	1	0	N	Y	Jefferson	Y	N
Keystone	2	100	1	0	0	N	Y	Island	Y	N
Anacortes	4	560	2	2	3	Y	Y	SKAT	N	N
Vashon Island Plus PO	0	100	2	1	1	N	Y	Metro	Y	N
Tahlequah	0	5	1	0	0	N	Y	Metro	Y	N
Sidney, B.C.	2	240	1	0	0	N	Y	BC Transit	Y	Y
Friday Harbor	0	255	1	1	0	N	Y	N/A	Y	Y
Lopez	0	75	1	0	0	N	Y	N/A	Y	Y
Shaw	1	15	1	0	1	N	N	N/A	Y	Y
Orcas	1	150	1	0	1	N	Y	N/A	Y	Y

### 3.5. Direction Setting

WSF faces many challenges associated with the replacement of the POS, including addressing POS's shortcomings and mitigating the associated inefficiencies and risks. This section describes the broad spectrum of issues that face the RCS implementation, and includes a recommendation from the Sierra Systems Project Team of how best to address them.

Sierra Systems identified and evaluated four different approaches to implementing the RCS. The spectrum of alternatives, as discussed during the project, is described in the following sections. In sequence they are:

- Replace
- Enhance
- Best Practices (RCS Foundation)
- Automate

The following table compares the four alternatives against the RCS Project Charter objectives and components. Replace and Enhance alternatives fails to meet the entire set of objective and components of the charter. Best Practices and Automate alternatives successfully address all sixteen aspects of the project charter.

**Figure 1 - RCS Project Charter Review Table**

<b>RCS PROJECT CHARTER REVIEW</b>				
<b>OBJECTIVES AND COMPONENTS</b>	<b>Replace</b>	<b>Enhance</b>	<b>Best Practices</b>	<b>Automate</b>
1. Define and document the business processes and requirements for the new system while assuring alignment with customer needs, expectations, and maximize business efficiencies	N	N	Y	Y
2. Improve revenue controls and ability to audit the revenue system	N	N	Y	Y
3. Replace the aging POS, back office accounting, attendant interfaces/applications and integrate all revenue collection points into an integrated system	P	P	Y	Y
4. Integrate with Regional Fare Coordination System (RFCS) project	N	Y	Y	Y
5. Include contract San Juan Island and Sidney B.C. revenue collection and reporting in the new automated system	Y	Y	Y	Y
6. In anticipation of adoption of new tariff regulatory changes by the Transportation Commission, develop alternatives, recommend, and implement approved revenue collection system initiatives, such as expansion of monthly passes, and period pricing of fares."	N	N	Y	Y
7. Develop an integrated turn key electronic system encompassing hardware, software, and supporting multiple methods of	N	P	Y	Y

RCS PROJECT CHARTER REVIEW				
OBJECTIVES AND COMPONENTS	Replace	Enhance	Best Practices	Automate
payment at toll booths and off premise locations				
8. Minimize the impact to transaction processing time at the tollbooth. Transaction processing will not change how early a customer must arrive at a terminal in order to make the sailing	P	Y	Y	Y
9. The system will incorporate and support established seller performance measures, policy and procedures	Y	Y	Y	Y
10. Develop a computer application that will support the evolution from the existing fare collection and control environment to the new system. Implementation of the new RCS must support a phased rollout strategy	P	P	Y	Y
11. Assure continued consolidated financial and traffic reporting, as well as improved/real time executive and management reports	P	P	Y	Y
12. Develop an application that will operate in WSF's information technology including client server and local area networks	Y	Y	Y	Y
13. Include comprehensive documented fare collection and control policies and operational procedures	N	Y	Y	Y
14. Develop and document opportunities for current and future improved vessel load statistics	N	P	Y	Y
15. Develop and document current and future system requirements for integrating Preferential Loading and Reservations	N	Y	Y	Y
16. Assure a smooth system transition, with an emphasis on training and on-going support"	Y	Y	Y	Y
<b>TOTAL: Y= Yes, P = Partial, N = No</b>	<b>4, 4, 8</b>	<b>8, 5, 3</b>	<b>16, 0, 0</b>	<b>16, 0, 0</b>

### 3.5.1. Alternative's Cost Summary

Four different alternatives each with it's own cost model was analyzed. The range of cost tracks closely to the features and capabilities of each alternative, with the exception of the Full Automation Alternative were a large spike in capital cost occurs because of terminal facilities re-design to accommodate new Automatic Vehicle Classification hardware, software and modifications to approaches to some terminal, in order to support a Fully Automated Revenue Collection system. Additional vehicle tollbooths were included to maintain the current processing rate. It 's assumed that a self service vehicle **tollbooth will require 45<sup>2</sup>** seconds/transaction, and the current staffed booth rate is 23<sup>3</sup> seconds/transaction. Examples of

<sup>2</sup> IBI – 1995 Passenger Flow Model and Results report prepared for Washington State Ferries

<sup>3</sup> IBI – Technical Memorandum 2.4 Passenger and Vehicle Requirements



RCS Best Practices pedestrians and drivers experience are found in the RCS Overview Document. The cost of the four different options ranges between \$4.9 million to a high of \$23 million. The cost of each alternative is presented below and in Figure 2 - RCS Alternative Cost Comparison.

The \$19 to \$23M estimate range for the Full Automation Alternative includes the cost for additional vehicle tollbooths; however, this estimate does not include the additional cost for property to accommodate the installation of the additional booths. No estimates were made for implementation of two approach lanes needed at the terminals. The Anacortes Multi Modal facility engineering estimate for grade separation and approach lane improvements, as an example, is \$12M. Colman Dock, Fauntleroy, Mukilteo, Bainbridge, Bremerton and Southworth need additional engineering estimates for approach lane modifications.

**Figure 2 - Alternate Cost Table**

<b>Alternative</b>	<b>Total Cost</b>
Replace	\$4,953,150 <sup>4</sup>
Enhance	\$8,964,383 <sup>5</sup>
Best Practices	\$11,962,383 <sup>6</sup>
Automate	\$20,315,383 <sup>7</sup>

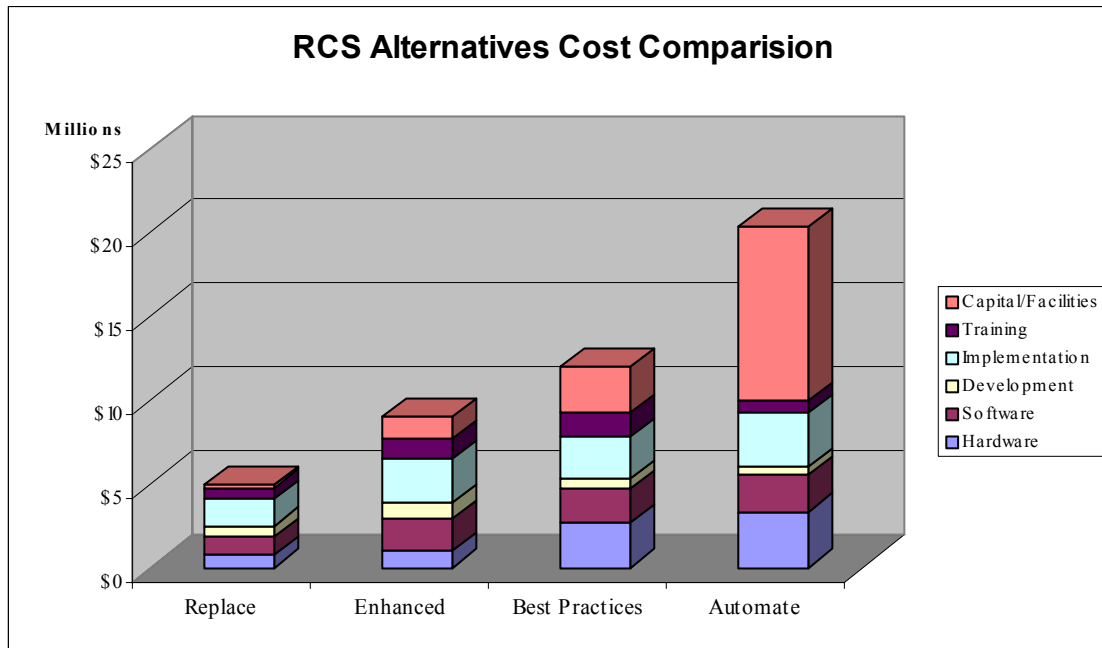
The Cost estimates for the Replace, Enhanced and Automate Alternatives were analyzed to a lesser degree than the recommended Best Practices Alternative. Should WSF decide to adopt one of these three options instead of the recommended Best Practices alternative it is recommended a more detailed analysis be completed.

<sup>4</sup> Complete cost detail refer to Replace Alternative Cost Model in Cost Model Binder

<sup>5</sup> Complete cost detail refer to Enhance Alternative Cost Model in Cost Model Binder

<sup>6</sup> Complete cost detail refer to Best practices Alternative Cost Model in Cost Model Binder

<sup>7</sup> Complete cost detail refer to Full Automation Alternative Cost Model in Cost Model Binder

**Figure 3 - RCS Alternative Cost Comparisons**

### 3.5.2. Replace

During the course of the interviews, completed by the Project Team to produce the Phase I deliverables, WSF personnel expressed that a simple approach to the RCS project might be desirable. This approach, called RCS Replace, represents the low-cost alternative for RCS implementation. RCS Replace requires execution of the following actions:

- Replacement of POS with its existing functionality intact, by moving it onto new hardware platform using commercially available Point of Sales equipment
- Minimal or no change to existing business processes. Example \$3.00 INS fee at Sidney B.C.
- Provide support of revenue collection activities in an essentially unchanged environment

The first of the RCS alternatives is a replacement of the existing POS system, with existing business processes unchanged, while only addressing four objectives of the Project Charter completely and four others partially.

A direct replacement of POS provides for direct sales at terminals, interface with the existing WSF Space reservation program, Web Sales, WSF back office receivables and inventory systems. The aging POS sales devices are replaced with commercially available point-of-sales devices.

WSF network topology is modified, removing DECnet, DEC terminal servers and other aging hardware infrastructure components, includes contract terminals.

The RCS Replace approach continues to manage inventory of pre-printed media, support commercial sales, and provide check verification and credit card processing using existing ARCS and ADS systems. The RCS Replace alternative provides the current data warehouse for sales and traffic analysis, improved bank reconciliation reports and charge account processing.

While revenue controls are improved in the RCS Replace, the replacement does not address the additional functionality required to reconcile sales to redemption and confirmation of redemption, nor does it support automated sailing statistics or voiding of pre-printed media. A detailed description of the RCS Replace option may be found in Section 4.

The benefits of the RCS Replace approach include:

- No organizational impacts
- No customer impacts
- Simplest implementation and deployment
- Minimal investment for facilities enhancements
- Inclusion of Contract Terminals on the San Juan Islands and Sidney, B.C.

The challenges stem from the fact that the approach:

- No improvements to revenue controls and the ability to audit the revenue system.
- No back-office accounting processes changes, nor does it integrate all revenue streams into an integrated system.
- No integrated support for the RFCS Smart Card or Tacoma Narrows Bridge.
- No functionality to support automation and WSF's long-term vision for revenue control.
- No automated redemption and confirmation
- No improvements to sailing statistics or vessel manifesting.
- No reduction or elimination of the need for fare determination.
- No Debit cards
- No change to current check acceptance
- No electronic signature capture
- No Change to Account Receivable
- No changes to paper media inventory (coupon books)
- No Change to WEB sales
- No Automated Reconciliation

**RCS Replace alternative does not support the project goals and objectives as stated in WSF RCS Project Charter in that it only fully meets four of the sixteen goals and objectives as stated in the RCS project Charter. The Sierra Systems Project Team does not recommend this approach for this reason.**

### 3.5.3. Enhance

At the outset of the project, the Project Team was asked to evaluate the replacement of POS while simultaneously streamlining the systems and improving business processes. Many of WSF's personnel expressed the opinion that a baseline implementation of the RCS that emulated POS would be highly desirable. RCS Enhance is an extension of Replace with additional back office functionality and systems. RCS Enhance requires execution of the following actions:

- Replacement of POS and back office systems, by locating them on new hardware platform using commercially available hardware and software
- Changes some to existing business processes, while most remain intact, example accept Debit cards as a form of payment
- Provide support of revenue collection activities in a state-of-the-art environment
- Provide support for integration of RFCS (Smart Cards)

The RCS Enhance alternative addresses thirteen of sixteen the goals as stated in the RCS project charter. Additionally, this approach provides for direct sales of fares at terminals when feasible and Web-based sales of fares, passes and reservations. The RCS Enhance integrated system provides for commercial account sales, fully automated inventory management, and verification of pre-printed media. The RCS Enhance option offers standard integration points ('interfaces') for the RFCS Smart Card integration, the Tacoma Narrows Bridge toll collection, and other future sales and redemption technologies.

The RCS Enhance alternative provides automated redemption of passes and media, electronic check processing, ancillary revenue, and bank reconciliation; including a data warehouse for sales and traffic analysis. Thirteen objectives and components of the project charter are fully address by the Enhanced alternative.

The benefits of the RCS Enhance approach include:

- Achieving the first step in meeting the goals outlined in the RCS project charter (internal controls, auditability, commercially available components).
- Minimal impact on WSF and its customers.
- Satisfying the vision articulated by WSF in the original project charter (quoted in section 3.2).
- Integrating with Regional Fare Coordination System (RFCS).
- Integrating charge account (A/R), general ledger and inventory control system.
- Limited investment for facilities enhancements

The challenges stem from the fact that the Enhance alternative:

- Limited back-office accounting processes changes
- Limited integration of all revenue streams into an integrated system.
- No support for the Tacoma Narrows Bridge.

- Limited functionality to support automation and WSF's long-term vision for revenue control.
- Limited automated redemption
- Limited improvements to sailing statistics
- No reduction or elimination of the need for fare determination.
- No change to current check acceptance
- No electronic signature capture
- Limited changes to Account Receivable (eliminated paper)
- No changes to paper media inventory (coupon books)
- Limited changes to WEB sales
- Limited Automated Reconciliation
- No definitive redemption point.
- Does not eliminate personal checks for services.
- Does not eliminate WSF pre-printed media as a form of payment.
- No self service
- Limited use of electronic forms of payment (Debit and Credit).
- Does not eliminate charge accounts for commercial traffic.
- Does not reduce RCS operations costs and lay the framework for future automation and efficiencies.
- Limited integration all existing sub system, Sailing States, Account Receivable, Reservations and Inventory

**RCS Enhance improves the overall processing environment, but does not meet the project goals for tighter revenue controls, or other primary goal and objectives of the new RCS, for example:**

- **Sales, redemption and confirmation procedures are not fully segregated, limiting the necessary audit controls that can be put in place**
- **Moving sales away from the tollbooths is not adequately addressed.**
- **Limited ability to easily incorporate new technologies**

**The Enhanced alternative does not provide a platform that enables WSF to easily move to the Best Practices or Automate alternatives without extensive modification to existing hardware and software systems, therefore the Sierra Systems Project Team does not recommend this approach.**

#### **3.5.4. Best Practices (RCS Foundation)**

The Best Practices (RCS Foundation) alternative represents the Sierra Systems Project Team's recommendations for the Revenue Collection System. The Best Practices option is the most suitable alternative to meet the RCS projects goals and objectives.

Best Practices replaces the existing POS environment with current technology while eliminating Commercial Charge Activity, Prepaid Media, and ceasing to accept checks for any transactions occurring at the tollbooth.

In the current environment implementing the recommended alternative – Best Practices (RCS Foundation)– will be most readily accomplished by separating it into two major components, RCS Foundation Step One and Step Two. It is our expectation that the elements embodied in RCS Foundation Step One can be implemented at all sites. Elements of RCS Foundation Step Two may require extensive labor negotiations and/or significant capital expenditures. A breakdown of the components of each step is detailed in Section 4.

The overall Best Practices alternative approach to the RCS project meets the goals and objectives of the Project Charter and provides a platform for moving to full automation in the future. This approach includes:

- Replacement of POS and elimination of select functionality
- Significant changes to existing business processes such as
  - Implement a fully integrated revenue collection system
  - Cease accepting checks and implement other forms of electronic payments
  - Eliminate commercial charge accounts
  - Integration of Smart Cards and Transponders
  - Scan and validate all media at redemption points
  - Eliminate pre-printed media
  - Implement automated vehicle metrics equipment
  - Implement confirmation points
  - Implement electronic signature capture
  - Implement single sale over the WEB
  - Implement integrated Reservation System
  - Implement Load Management System
- Addressing most preexisting weaknesses in systems controls and data reliability
  - Improve data reliability
  - Improve cash management activities (cash vault services)
- Continues to support revenue collection activities in a changed environment

During the course of the interviews—conducted by Sierra Systems Project Team to produce the Phase I deliverables—members of WSF personnel stated that the Best Practice Alternative was the desired outcome. However, many interviewees expressed concerns over the ability of the organization to accommodate the changes required to pursue this approach.

The RCS Best Practices approach provides direct sales of fares at terminals, provides for Web-based sales of fares, permits and reservations, and provides self-service kiosks to move sales of single-fares and passes away from the tollbooth. The RCS Best Practices eliminates the acceptance of checks, commercial accounts and printed media.

The RCS Best Practices option provides standard integration points ('interfaces') for the RFCS Smart Card integration, the Tacoma Narrows Bridge toll collection, and other future sales and redemption technologies. The RCS Best Practices provides automated redemption of passes, use of vehicle matrix technologies for automated fare determination, vehicle and face counting technologies to enhance redemption statistics, and offers fully automated confirmation of redemption and reliable, real-time sailing statistics. The RCS Best Practices approach also offers a highly accurate data warehouse for sales and traffic analysis.

The benefits of the RCS Best Practices approach include:

- Automated redemption and confirmation to provide greater internal controls, and auditability of information.
- Reliable, real-time sailing statistics.
- Elimination of checks, which will reduce loss due to costly NSF processing, and decrease wait times at tollbooths.
- Electronic payment options and elimination of commercial charge accounts and printed media, which will in turn provide greater security and control over revenue and reduce revenue leakage.
- A stable, structured foundation for future automation and revenue recapture.
- Improved customer service
  - Self service kiosks
  - Automated passenger redemption
  - Automation fare determination for vehicles
  - Integrated Reservation System and real time schedule data
  - Expanded forms of electronic payments
  - Integration with external transit organizations

The challenges of the approach include:

- The elimination of checks, printed media, vouchers and commercial accounts will have a significant impact on a segment of existing customers.
- A significant organizational impact on the Washington State Ferries in terms of new technologies and new business processes.
- Additional capital investment in equipment for vehicle and face counting technologies and vehicle measurement.
- Revising and communicating a new tariff structure, preferential loading classes, staging and boarding procedures requires substantial organization effort and cooperation by the Tariff Policy Commission and possibly the Legislature.

**RCS Best Practices represents the most suitable alternative to meet the project goals and objectives and provides a platform enabling WSF to implement full fare automation in the future. All objectives and components of the RCS Project Charter as fully addressed. The Sierra Systems Project Team recommends this approach.**

### 3.5.5. Automate

The next step in the RCS evolution is best described as adopting long-term vision for WSF revenue collection. It incorporates the RCS Best Practices options, while extending the concepts of automation wherever feasible and financially viable. RCS Automate represents the Sierra Systems Project Team's recommendations for automating processes once the Best Practices have been implemented. The approach involves execution of the following actions:

- Replacement of POS while further eliminating functionality
- Implement significant changes to existing business processes
- Resolving remaining weaknesses in systems controls and further improving data reliability
- Continuing to support revenue collection activities in a further changed environment
- Extracting substantial hard benefits from the revenue collection stream, through reductions in Ticket Seller FTE's

Unlike all other alternatives, automating the tollbooth's sales and redemption requires consideration of several additional elements:

- Redesign of terminal facilities
- Redesign of terminal operations
- Marketing of a new customer experience

**Due to the magnitude of changes derived from fully automating the sales transaction, and its impact on WSF and its customers, the Project Team recommends against incorporating the automate alternative as a component of the RCS Project Phase II implementation.**

The RCS Automate approach entails moving direct sales of fares and reservations away from terminals, through the use of the Web and self-service devices. In this approach the RFCS Smart Cards replace passes and most transactions are completed using electronic means—credit card or debit card.

With the adoption of the RCS Automate, terminals are able to fully automate redemption and provide confirmation points. RCS Automate manages load assignment, accommodating reservations and preferential loading agreements. Redemption is confirmed using vehicle and face counting devices. Sailing statistics are maintained in real-time and displayed on electronic billboards at the terminal and over the Web.

The RCS Automate alternative is fully integrated with the RFCS Smart Card system, the Tacoma Narrows Bridge toll collection, and other future sales and redemption technologies.

The benefits of the RCS Automate option includes:

- Fully automated redemption and confirmation to provide greater internal controls.
- Reliable, real-time sailing statistics.



- Transactions will be completed using electronic forms of payment or cash at automated devices.
- Electronic payment options will provide greater security and control over revenue and will reduce revenue leakage.
- Elimination of printed media and commercial accounts will reduce loss due to existing inadequate redemption and internal controls.
- Enable extraction of substantial hard benefits from the revenue collection stream.

The challenges of the RCS Automate include:

- The elimination of checks, printed media, vouchers, and commercial accounts will have a significant impact on a segment of existing customers.
- The approach will have significant organizational impact on the Washington State Ferries. Implementation of the Long-term Vision for RCS cannot be achieved concurrently with RCS Best Practices.
- The approach most likely will involve multi-million dollar terminal capital improvement costs.
- Marketing a new customer experience.

The above-outlined approach for the RCS, presents a reasonable outcome of a subsequent phase of this project. It is crucial that WSF management understands and accepts that this approach cannot be achieved as part of Phase II, though much of the project work may be performed concurrently.

When removing the human component from a key business process—and for an automation project to be successful—it is required that the replacement solution starts from a stable system, and well defined and consistently applied business processes. The Sierra Systems Project Team foresees WSF achieving these necessary goals after Phase II is complete. Automation projects undertaken that lack a stable environment and/or consistent processes, frequently overrun their budgets, and seldom are able to extract the identified benefits on which these budgets were justified.

### 3.6. Comparison of Alternatives

The following table compares the alternative versions of RCS.

	Alt 1 Replace	Alt 2 Enhance	Alt 3 BP Step One	Alt 3 BP Step Two	Alt 4 Automate
<b>Direct Sales</b>					
New commercial, off-the-shelf point-of-sale hardware	√	√	√	√	√
<b>Other Hardware</b>					
Handheld point of sale devices		√	√	√	√
Credit Card Reader	√	√	√	√	√
Check MICR Reader	√	√			
Barcode Reader		√	√	√	√
RFC Smart Card Interface		√		√	√
Debit PIN Pad		√	√	√	√
Signature Capture Device			√	√	√
TNB Transponder Reception Device				√	√
Kiosks				√	√
Vehicle Metrics equipment				√	√
Vehicle counting device				√	√
Face counting device				√	√
Receipt Printer	√	√	√	√	√
<b>Payment By:</b>					
Cash, Credit card	√	√	√	√	√
Travelers Checks	√	√	√	√	√
Check	√	√			
Debit Card		√	√	√	√
Pre-Printed Media	√	√	√		
Monthly Passes	√	√	√		
RFCS - Smart Card		√		√	√
TNB Transponder				√	√

	Alt 1 Replace	Alt 2 Enhance	Alt 3 BP Step One	Alt 3 BP Step Two	Alt 4 Automate
Commercial Charge Account	√	√			
Self Service Kiosks				√	√
<b>Fare Determination:</b>					
Automated Vehicle Measurement				√	√
Automated vehicle counting				√	√
<b>Web Sales</b>					
POS Web Sales Application	√				
RCS Integrated Web Sales Application		√	√	√	√
<b>Refunds</b>					
Use existing processes and policies for refunds of cash, check, media	√				
Refunds of available tender processed at secure location		√	√	√	√
Automated refund of RFCS Smart Card value				√	√
Voids of credit card	√	√	√	√	√
Voids of debit card		√	√	√	√
<b>Third party sales</b>					
Recorded via existing ARCS Revenue System	√				
Integrated RCS Third Party Sales Application		√	√		
RFCS				√	√
<b>Ancillary Revenue</b>					
Uses existing back office system	√				
New revenue accounting system		√	√	√	√
<b>Revenue Controls</b>					
Manual reconciliation of media	√				
Automated reconciliation of media		√	√		
Fully automated revenue reconciliation				√	√
Integration of Contract Terminals	√	√	√	√	√
Automated bank reconciliation		√	√	√	√
Change fund automation		√	√	√	√
<b>NSF</b>					
Use existing NSF processing	√				
Automated check acceptance & EFT transfer		√	√	√	√
<b>Inventory</b>					

	Alt 1 Replace	Alt 2 Enhance	Alt 3 BP Step One	Alt 3 BP Step Two	Alt 4 Automate
Use existing inventory system	√				
RCS Integrated Inventory application		√			
RCS replaces Inventory (Retailer SC inventory)				√	√
<b>Commercial Charge Accounts</b>					
Use existing AR system	√				
RCS Integrated existing AR application		√			
<b>Redemption</b>					
Manual redemption process	√				
Partially automated redemption		√	√	√	
Fully automated redemption					√
<b>Confirmation</b>					
Fully automated confirmation				√	√
<b>Reservations</b>					
Existing WSF Space reservation system	√				
Integrate and Improve Existing WSF Space reservation system		√			
RCS Replaces Reservations system (includes Preferential Loading)			√	√	√
<b>Load Management</b>					
Partially automated load management (lane assignment, staging)				√	
Fully automated load management					√
<b>Sailing Statistics</b>					
Manual Sailing Statistics – existing system	√				
Partially automated existing Sailing Statistics		√	√		
Fully automated Sailing Statistics new system				√	√
Vessel Manifests				√	√
<b>Reporting</b>					
New reporting system	√	√	√	√	√
Management reporting		√	√	√	
Improved Management Reporting					√
New data warehouse	√	√	√	√	√
Limited integration with AR, inventory	√				
Integrated AR		√			
Replace AR				√	√
Integrated inventory		√	√		

	Alt 1 Replace	Alt 2 Enhance	Alt 3 BP Step One	Alt 3 BP Step Two	Alt 4 Automate
Replace Inventory				√	√
<b>Business Processes</b>					
Manual Processes Reduced		√	√		
Manual Processes Eliminated				√	√
Consistent Business Processes Established		√	√		
Consistent Business Processes Refined				√	
Consistent Business Processes Automated					√
<b>Systems Integration</b>					
Multiple independent systems	√				
Integrated existing core applications with several independent interfaced systems – A/R, Sailing Stats, WEB, Reservations, Inventory		√			
Replace application suites - A/R, Sailing Stats, WEB, Reservations, Inventory			√	√	√
<b>Internal Controls</b>					
Audit Issues Unchanged	√				
Audit Issues Partially Resolved		√	√		
Audit Issues Mostly Resolved				√	√
Internal controls unchanged	√				
Internal controls improved		√	√		
Additional Internal controls introduced				√	√
<b>Primary Customer Interaction</b>					
Customer to staff	√	√	√		
Mix of customer to staff and customer to machine				√	
Customer to machine					√
<b>Enterprise Transaction Data Management</b>					
Improved reliability	√	√	√	√	√
Common data warehouse	√	√	√		
Enterprise data warehouse				√	√
Complete, accurate and timely				√	√
<b>Facilities and Physical Infrastructure</b>					
No impact	√				
Limited change		√	√		
Capital investment required (i.e. Vehicle Measurement equipment, face counting technology)				√	
Extensive capital investment required (terminal redesign)					√

	Alt 1 Replace	Alt 2 Enhance	Alt 3 BP Step One	Alt 3 BP Step Two	Alt 4 Automate
<b>Benefits</b>					
Limited FTE reductions				√	
Extensive FTE reductions					√
Revenue collection activities continue unimpeded	√	√	√		
Revenue leakage is significantly reduced		√	√	√	√

## 4. ALTERNATIVE DESIGN 1 – REPLACE

The following section describes the Washington State Ferries Revenue Collection System (RCS) as a direct replacement for POS. This system, referred to as RCS Replace, is a direct replacement of the existing POS system. This approach represents the low-cost alternative for RCS implementation. It provides the same features and functions, as the existing POS, but it exists on new hardware platforms using commercially available point-of-sale equipment.

The functionality provided by the RCS Replace is derived from the existing POS system. The RCS Replace approach involves:

- Replace existing network
- Moving the existing functionality and hosting it on a new platform.
- Replacing the existing point-of-sale equipment with new, commercially available point-of-sale equipment.
- Addressing of issues raised in the Washington State Ferries Revenue Collection System Future Topology, specifically:
  - Eliminating DECnet
  - Providing redundant networking
  - Centralizing operations in one location

In the end, the RCS Replace will provide the following functions:

- Direct Sales using new point-of-sales equipment
- Interface with existing Web Sales
- Interface with existing AR system for commercial accounts
- Interface with existing ADS credit card services for credit card processing
- Interface with existing Non Sufficient Funds data
- Interface with existing WSF Space Reservations program
- Interface with existing ARCS Inventory and Revenue System
- Interface with existing Sailing Statistics
- Bank deposit reconciliation reports
- Predefined, user-defined and ad hoc reporting
- Data warehouse for transaction and sales analysis
- Interface with legacy systems such as TRAINS

**RCS Replace does not support the project goals and objectives. The Sierra Systems Project Team does not recommend this approach.**

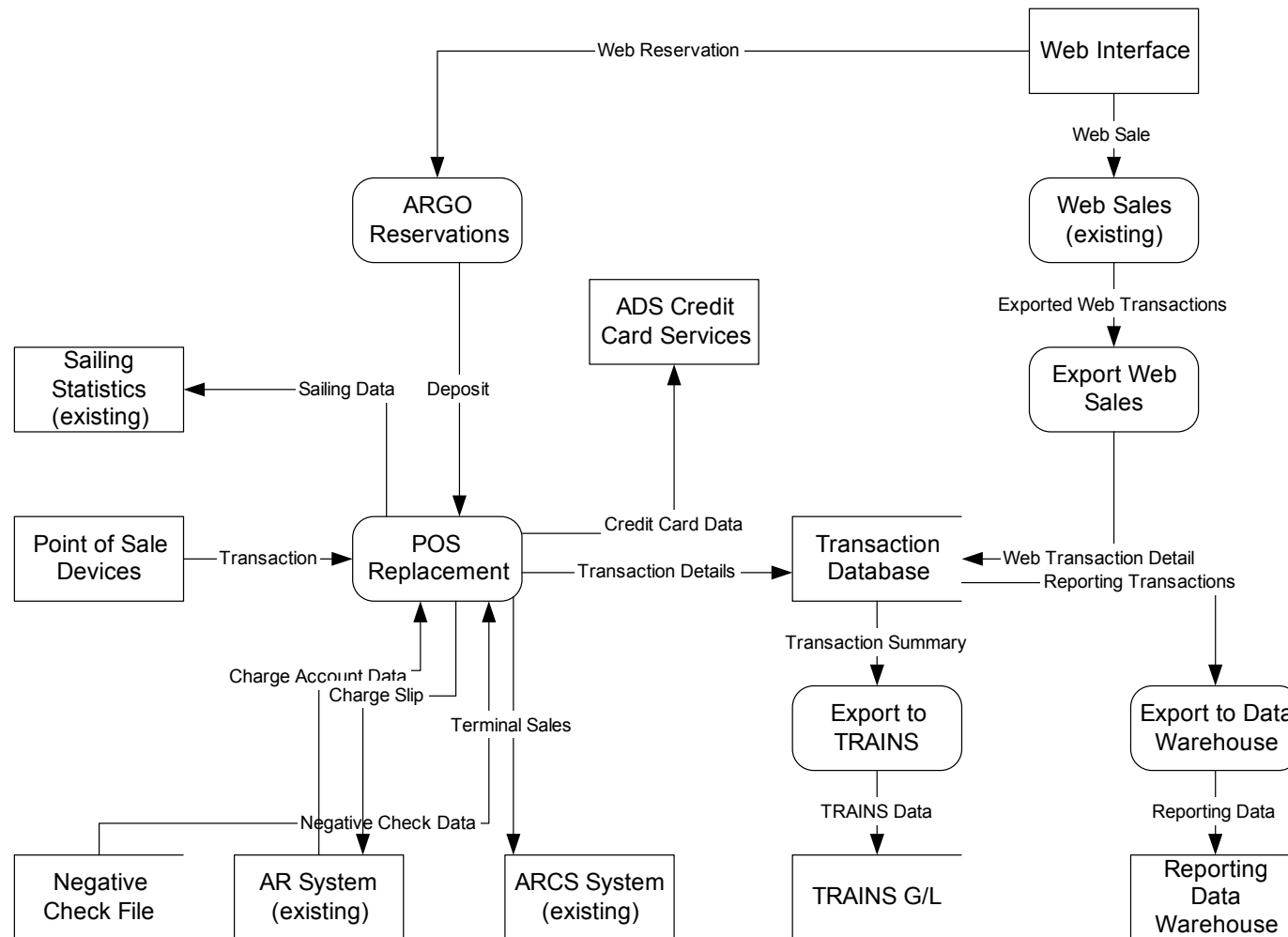


Figure 4: RCS Replace High-Level Data Flow Diagram



Figure 4 shows the high-level interfaces and data flows of the RCS Replace system, which provides services or integrates with the external systems outlined below.

Reservations	RCS Replace interfaces with WSF Space Reservation program, an existing Web reservation system to redeem reservations, and apply deposits to fares.
Web Pass Sales	RCS Replace interfaces with the existing Web sales system to track Web sales revenue.
Credit Card Processing	RCS Replace uses Alliance Data Systems Credit Card Services, <i>an existing system</i> to validate credit card sales and process credit sales and credits. ADS deposits credit card account settlement funds into WSF's bank. RCS Replace reconciles ADS settlement bank deposits with sales and refunds.
WSDOT TRAINS G/L	RCS Replace posts journal entries summarizing all transactions by G/L account to the WSDOT accounting system, TRAINS.
Commercial Charge Accounts	RCS Replace validates accounts and posts charge transactions to Advanced AR, <i>an existing system</i> .
Ancillary Revenue	RCS Replace does not track or manage revenue from ancillary activities such as HAZMAT sailings and vessel charters.
Reconciliation	RCS Replace provides reporting to aid in bank account transaction reconciliation with WSF's bank.
Electronic Funds Transfers	RCS Replace does not process electronic funds transfers.
Media Inventory	Media inventory is managed by the existing ARCS inventory management system. RCS Replace does not interface with third-party retailers for media reconciliation or sales reporting.
Negative Checks	RCS Replace verifies checks against the list of NSF checks downloaded from WSF's bank (uses existing SCAN system). RCS Replace system refuses to accept checks listed on the negative check file for payment of fares and services.
Exchange Rates	RCS Replace currency exchange rates are set manually.
RFC Smart Cards	RCS Replace does not integrate with RFCS Smart Cart systems.
Self-Service	RCS Replace does not provide customer self-service.
Direct Sales	RCS Replace provides an online point-of-sale mechanism to support sales at ferry terminals. The Seller or Attendant determines fare.
Vessel Manifesting	RCS Replace provides online entry of manually determined sailing statistics. POS Replace does not automate vessel manifesting.
Future Sales and Redemption	RCS Replace does not provide interfaces for future sales and redemption systems.

## 4.1. Sales

The RCS Replace alternative direct sales at a terminal consist of these high-level functions:

- Selling fares, tickets, and passes
- Selling fares on account to commercial charge customers
- Redeeming fares, tickets, and passes
- Processing refunds/voids for cancelled sailings presented the same day

Direct sales transactions are initiated at a RCS Replace alternative point-of-sale device in the tollbooth.

Under normal operations, the RCS Replace alternative direct sales uses networked interfaces to the following systems:

- ADS credit card processing services (existing) for credit card validation and payments
- Negative Check File (existing) for rejection of NSF checks
- The existing Advanced AR data base for charge account validation and transaction processing
- The existing ARCS Inventory system for media inventory control

While WSF's future network topology will provide sufficient redundancy to provide connectivity, in the event of network failure the RCS Replace alternative point-of-sale devices will operate without a functioning network. Under this condition, the RCS Replace alternative will accept credit card, checks and reservations transactions with batched validation.

Outputs of the direct sales process include:

- Charge transactions to accounts receivable
- Transaction details recorded in transaction database

The sales functions and processes are detailed in the next section.

### 4.1.1. Direct Sales

#### **RCS Replace Alternatives Direct Sales Equipment**

##### ***Toll Booth Point-of-Sale Equipment***

Terminal sellers will use a standard point-of-sale device to sell, void and refund fares and other sales. Characteristics of the point-of-sale device are as follow.

### **Standard Equipment**

- Processor, memory and storage
- Flat panel touch screen
- Customer Display Screen for presentation of transaction details
- Standard keyboard and mouse
- Cash Drawer

### **Input Devices**

- Credit Card/MICR (magnetic stripe) Reader
- Check MICR Reader

### **Output Devices**

- Receipt printer

### **System Devices**

- 10/100 basset Fast Ethernet connection

### **Operating System**

- Windows 2000

The tollbooth point-of-sale device will function as a cash register for recording sales and redemptions as describe below.

The tollbooth point-of-sale device is used in an industrial environment and in direct sunlight. The point-of-sale device will be resistant to dust and splashed water in conformance with level IP52 of IEC standard 60529. The display will be readable in direct sunlight.

The point-of-sale device will provide a display to present the customer with complete details of the transaction including fare and fare components.

## **Handheld Point-of-Sale Equipment**

The RCS Replace alternative does not provide interfaces for handheld point-of-sale equipment.

## **RCS Replace Alternatives Direct Sales Functions**

### **Fare Determination**

The Seller determines the fare based on the number and type of passengers, vehicle characteristics, route, schedule information, and deposits paid for reservations. The seller/ ticket-taker enters the fare(s) into the point-of-sale device. The fare is then paid with cash, credit card,

check, voucher, commercial account or pre-printed ticket media. The transaction is recorded in the RCS Replace transaction database; the statistics are updated and a receipt is printed.

## Sales Functions

The Terminal Seller will use the point-of-sale device to collect and record fares, fees for other services, to process refunds for cancelled sailings, and to reconcile the cash drawer.

The RCS Replace alternative enables the Terminal Seller to perform the following functions:

- Process payment—by determining fare type and selecting the payment method (cash, credit, etc.).
- Determine correct change—the RCS Replace system accepts payments in US and Canadian currency with the ability to determine correct change in USD for cash and Traveler's Checks.
- Process credit payments—the RCS Replace alternative validates credit and posts the transaction in to the ADS Credit Card Processing System.

Major payment processing functions include:

- Cash Payments
  - Collect cash payments in United States and Canadian Dollars at tollbooth.
  - Calculate the Canadian dollar equivalent of fare.
  - Accept Canadian currency and calculate the correct change in US dollars.
- Credit Card Payments
  - Accept credit card payments at tollbooth.
  - Card numbers are read using magnetic card reader.
  - Credit is validated and processed using the ADS credit card services link.
- Personal Check Payments
  - Accept personal check payments at the tollbooth.
  - Check's routing and account numbers are read with MICR reader.
  - RCS Replace alternative validates the account number and routing codes against the negative check file and displays check acceptance status.
- Cashier's Check Payments
  - Accept cashiers check payments at the tollbooth.
- Travelers' check payment
  - Accept Travelers' Checks payments at the tollbooth.
  - Canadian currency Travelers' Checks, RCS Replace calculates the USD equivalent of CAD.
- Accept WSF charge account slips and charge cards
- Accept WSF media—vouchers, tickets, or passes
- Correct errors
  - The system permits the seller to void all or part of an erroneous transaction

- Split payments
  - The RCS Replace alternative permits the seller to split the payment between multiple forms such as cash, voucher, credit card, gift certificate and personal check.
- Post reservation deposits

### **Finalize Transaction**

- Finalize Transaction
  - The RCS Replace alternative does not allow cash and credit card transaction to be finalized until the amount tendered is entered; once entered, it prints a receipt and records the transaction in POS Replacement database.
  - For cash or check payments, POS Replacement does not allow the next transaction to begin until the cash drawer is opened and closed.

### **Seller Support Functions**

The RCS Replace alternative offers the following seller support functions:

- Initiate cash pick-up
  - The RCS Replace alternative periodically requests the seller to pull excess cash from the cash drawer for deposit, prints a drop receipt, and updates the seller cash amount on hand.
- Request coin orders
  - The RCS Replace alternative enables the seller to purchase coin from the Terminal Agent.

### **Ticket-Taker/Attendant Functions**

The Terminal Attendant will use the point-of-sale device to collect passes and reconcile accepted media inventory. In turn, the RCS Replace alternative offers the following attendant support-functions:

- Redeem passes and tickets
  - This function enables the attendant to redeem a pass or ticket.

### **Terminal Agent Functions**

The Terminal Agent will use the point-of-sale device to maintain terminal inventory levels, manage cash receipts and deposits, and monitor the transaction statistics. The RCS Replace alternative offers the following Terminal Agent support-functions.

- Detailed transaction reports
- Seller summary totals
- Transaction and revenue statistics

- Process cash pick-up

## **Direct Sales Outputs**

### ***Receipts***

The RCS Replace alternative prints a receipt detailing the transaction on the thermal receipt printer. Outputs may include, but are not limited to:

- WSF Title
- Transaction Type (Sales, Refund, Exchange)
- Date and Time of Transaction
- Date and Time of Sailing
- Seller ID
- Originating terminal
- Destination
- Fare
- Payment type
- Amount and currency tendered.
- Change returned
- Credit card numbers are not displayed in full.
- Customer name if on file or on credit card
- Signature line, if applicable

### ***Seller Reporting***

The RCS Replace alternative offers the following seller reporting functions:

- Cash-out Report—used by the seller to balance the working float from the point-of-sale device.
- Media Inventory Report—lists the expected media inventory by type for a given seller or tollbooth.
- Accepted Media Inventory Report—lists the media redeemed for passage by type.
- Station Sales Report—lists sales performed at a station by type and amount.
- Agent Loans Report—lists all float transactions performed by a station/seller.
- Final Declare Report—lists the expected cash and media on hand at the end of a seller's shift or during periodic audits.

## **4.1.2. Self-Service**

The RCS Replace system does not provide automated self-service sales.

#### **4.1.3. Web Sales**

RCS Replace interfaces with the existing Web pass sales system to track Web sales revenue.

#### **4.1.4. Refunds**

The RCS Replace provides the following refund and void functions:

- Refund Cash, Check, or Credit Card
  - This process is used to refund cash, check, and credit card single fare transactions.
  - The RCS Replace records the refund in the POS Replacement database.
- Refund Charge Slips or Media
  - This process is used to refund charge slips or media transactions.
  - The RCS Replace records the refund in the POS Replacement database.

#### **4.1.5. Third Party Sales**

The RCS Replace does not automate management or reporting of retail third-party monthly pass sales revenue.

#### **4.1.6. Ancillary Revenue**

The RCS Replace alternative does not automate management or reporting of ancillary revenue such as fees, contract payments and accounting revenue.

### **4.2. Revenue Controls**

#### **4.2.1. Balancing**

The RCS Replace provides reports for the following functions:

- Initial declare
  - The RCS Replace enables a seller to enter the amount of currency and inventory at the time the seller begins sales shift.
- Final declare
  - The system enables a seller to enter the amount of currency and inventory at the time the seller ends sales shift. The actual amount counted is then compared to the amount calculated by the system and an over/under receipt is printed.
- Inventory Media
  - The RCS Replace enables a seller to declare inventory on hand and compares this to the inventory RCS Replace has for the seller. An over/under receipt is generated if required.

#### **4.2.2. Head Office Cash Reconciliation**

The RCS Replace provides the following reports:

- Bank Deposit Reconciliation Report—which provides information to match bank deposits with Agent, seller and attendant cash drops.

#### **4.3. NSF**

The RCS Replace uses an existing Negative Check File for NSF check detection and rejection. No additional functionality is provided.

#### **4.4. Inventory**

The RCS Replace uses the existing ARCS Inventory Control System for media inventory management. No additional functionality is provided.

#### **4.5. Commercial Charge Accounts**

The RCS Replace uses the existing Advanced AR system for commercial charge accounts. No additional functionality is provided.

#### **4.6. Redemption**

The RCS Replace provides the following redemption functions:

- Redeem passes function—enabling the attendant to redeem a pass.
- Redeem single-use ticket, voucher, or certificate—enabling the attendant to redeem a single-use ticket, voucher, or certificate.

Media are not scanned for validity under the Replace alternative.

#### **4.7. Reservations**

##### **4.7.1. Reservation Process**

Reservations are made with the existing WSF Space Reservation system.



#### **4.7.2. Preferential Loading**

Preferential loading data is managed with the existing WSF Space Reservation system.

### **4.8. Vessel Manifest and Sailing Statistics**

#### **4.8.1. Vessel Manifest**

The RCS Replace does not provide vessel manifest functionality

#### **4.8.2. Staging**

The RCS Replace does not provide vehicle staging functionality

#### **4.8.3. Sailing Statistics**

The RCS Replace feeds redemption information into the existing Traffic Statistics system. No additional functionality is provided.

### **4.9. Reporting**

The RCS Replace provides predefined, custom and ad-hoc reporting capabilities using standard reporting products.

#### **4.9.1. Management Reporting**

The RCS Replace provides standard and custom reports for all components in the system. Custom reports include, but are not limited to:

- Revenue Performance
- Audit Trail reporting

#### **4.9.2. Data Warehousing**

The RCS Replace data warehouse maintains information about all transactions recorded by the system's revenue accounting functions. The data warehouse is optimized for reporting purposes and contains final transaction information. Charge details are deleted for customer protection and optimal reporting performance. For performance reasons, the RCS Replace data warehouse is maintained on a dedicated server.

The RCS Replace data is imported automatically into the data warehouse on a scheduled, periodic basis.

The RCS Replace data warehouse supports modern reporting and analysis tools permitting users to perform complex queries and analysis of RCS Replace data and create ad-hoc and predefined reports.

## 4.10. Technical

### 4.10.1. Information Tracking

The RCS Replace assigns unique identification numbers to all transactions, transaction line items and system and lookup information.

This function permits all RCS Replace information to be identified uniquely, tracked and viewed over time.

### 4.10.2. Change Tracking

The RCS Replace does not provide additional change tracking features

## 5. ALTERNATIVE DESIGN 2 – ENHANCE

The Project Team was originally asked to evaluate the replacement of POS and back office accounting software while simultaneously streamlining the systems and improving the business processes. RCS Enhance represents an extension of Replace with additional back office functionality and systems. This system is a replacement and enhancement of the existing POS and ARCS revenue management systems, and is to be located on new hardware platforms using commercially available point-of-sale equipment.

The functionality of the RCS Enhance alternative is derived from RCS Replace with following changes:

- Replace existing network
- Improved integration with existing WSF Space Reservations system to display reservation information on the point of sale devices.
- Replacement of the existing Web Sales Application with an RCS Integrated Web Sales system capable of online sales of passes permits and single fares.
- Extension of credit card processing to include debit cards.
- Use of third-party integration brokers to manage interfaces to TRAINS and other legacy systems.
- Replacement of the existing ARCS System.
- Integrate with existing Account Receivable and inventory systems.
- Full integration of ancillary and third party revenue management.
- Scan all media bar codes and serial numbers for automated validation and redemption of printed media.
- Integration with RFCS future sales technology.

The RCS Enhance alternative offers the following functions:

- Direct sales at the terminal
- Web-based self-service for
  - Pass sales
  - Reservations
- Full integration with RFC Smart Card redemption
- Improved sailing statistics
- Improved redemption
- Ancillary revenue management
- Automated bank deposit reconciliation
- Predefined, user-defined and ad hoc reporting tools
- Integration brokerage services for integrating RCS Enhance alternative with TRAINS and other legacy systems.

The RCS Enhance alternative will replace existing POS data warehouse. The RCS Enhance alternative will provide improved back office functionality and will automate the media redemption and reconciliation processes.

**RCS Enhance improves the overall processing environment, but does not meet the project goals for tighter revenue controls, automation and moving sales away from the tollbooths. The Sierra Systems Project Team does not recommend this approach.**

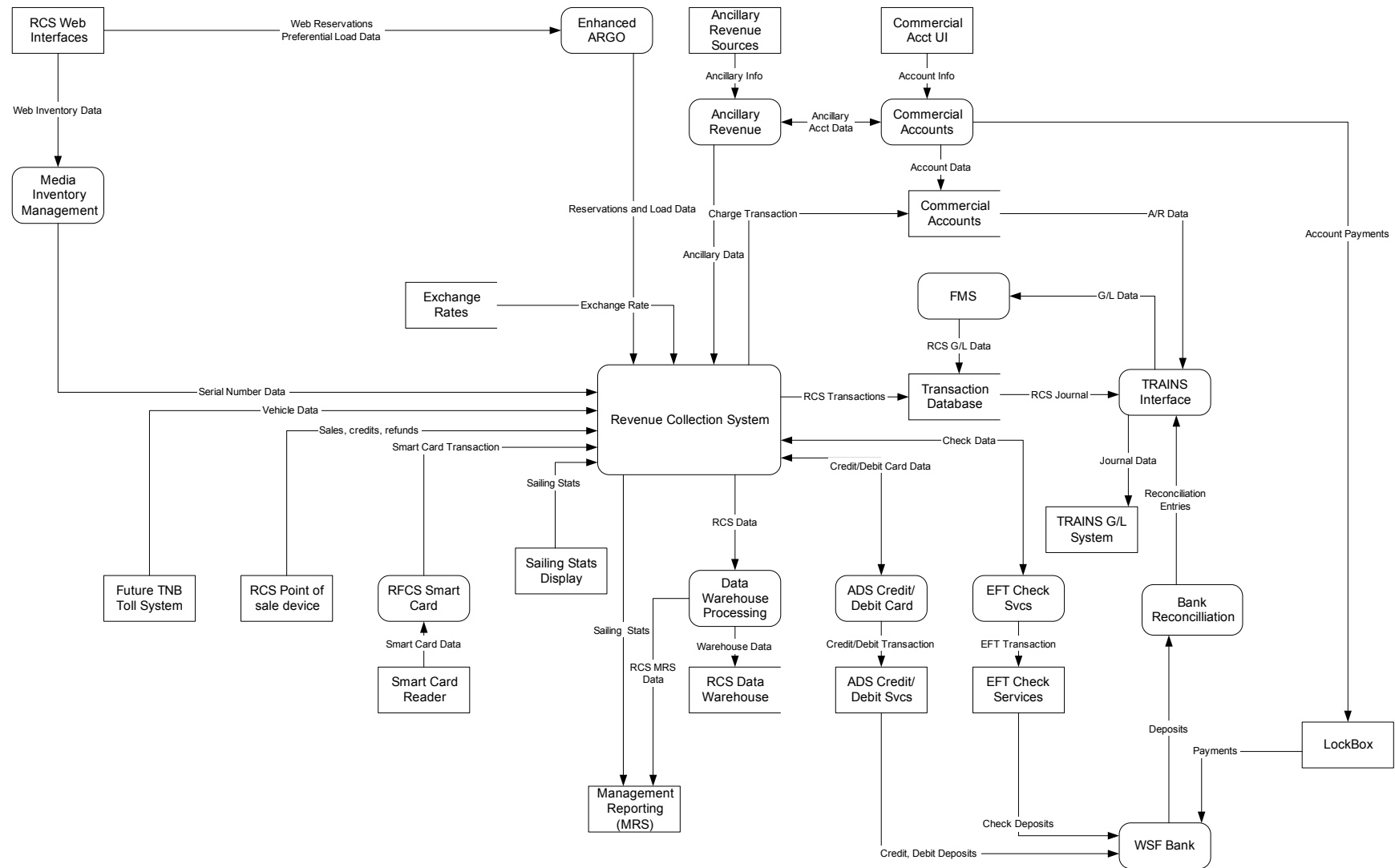


Figure 5: RCS Enhance alternative Data Flow Diagram

The RCS Enhance provides the services outlined below, or integrates with the following external systems:

Reservations	RCS Enhance integrates with the existing WSF Space Reservations system and displays reservation information on the point of sale devices.
Web Pass Sales	RCS Enhance replaces the existing Web pass sales with new functionality for Web-based sales of passes.
Credit Card Processing	RCS Enhance extends existing Alliance Data Systems Credit Card Services functionality to provide real-time credit card and debit card sales with e-signature capture.
WSDOT TRAINS G/L	RCS Enhance integrates with the existing WSDOT accounting system, TRAINS, using third-party integration brokers to manage posing of G/L transactions.
Commercial Charge Accounts	RCS Enhance integrates with the existing Advanced A/R system with new commercial charge account functionality.
Ancillary Revenue	RCS Enhance tracks and manages revenue from ancillary activities such as HAZMAT sailings and vessel charters.
Reconciliation	RCS Enhance provides automatic bank account transaction reconciliation with the bank.
Electronic Funds Transfers	RCS Enhance provides support for EFT processing commercial account payments.
Media Inventory	RCS Enhance replaces the existing ARCS inventory system with an integrated, perpetual inventory system.
Negative Checks	RCS Enhance automates check processing and validation.
Exchange Rates	RCS Enhance maintains a table of exchange rates and are updated on demand by WSF accounting using an electronic interface.
RFC Smart Cards	RCS Enhance accepts fares sold using the Regional Fare Coordination Smart Card service. RCS Enhance alternative tracks RFC settlements made to WSF's bank and reconcile bank deposits with RFC redemptions.
Self-Service	RCS Enhance does not provide customer self-service.
Vessel Manifesting	RCS Enhance partially automates collection of sailing statistics, but does not produce full vessel manifests for non-international routes.
Future Sales and Redemption	RCS Enhance provides standardized interfaces to support future sales and redemption devices.

## 5.1. Sales

The RCS Enhance alternative direct sales at a terminal consists of these high-level functions:

- Selling fares, tickets and passes
- Selling fares on account to commercial charge customers
- Redeeming fares, tickets and passes
- Processing refunds/voids
- Redeeming reservations and cross-referencing

Direct sales transactions are initiated at a RCS Enhance alternative point-of-sale device, either handheld or in the tollbooth.

Under normal operations, the RCS Enhance alternative directs sales use networked interfaces to the following systems:

- ADS credit card processing services for credit and debit card validation and payments.
- An electronic funds transfer service for detection of NSF checks, and to automate checks processing.
- An integrated commercial charge accounts system for validating commercial charges.
- An integrated perpetual inventory system for media (ticket, pass and voucher) inventory control.

While WSF's future network topology will provide sufficient redundancy to provide connectivity, in the event of network failure, RCS Enhance point-of-sale devices will operate without a functioning network. Under this condition, RCS Enhance alternative will accept credit card, debit card, checks and reservations transactions with batched validation.

Outputs of the direct sales process include:

- Charge transactions to accounts receivable
- Transaction details recorded in transaction database

The sales functions and processes are detailed in the next section.

### 5.1.1. Direct Sales

#### Direct Sales Equipment

The RCS Enhance system extends direct sales equipment described for the RCS Replace in the *Alternative Design 1 – Replace* section, with additional devices to support enhanced point-of-sale functionality. RCS Enhance provides support for handheld point-of-sale equipment, debit card PIN pads, and Smart Card interfaces.

## **Toll Booth Point-of-sale Equipment**

Terminal sellers will use a standard point-of-sale device to sell, void and refund fares and other sales. Characteristics of the point-of-sale device are as follows.

### **Standard Equipment**

- Processor, memory and storage
- Flat panel touch screen/tablet
- Customer display screen for presentation of full transaction details
- Standard keyboard and mouse
- Cash drawer

### **Input Devices**

- Credit Card (magnetic stripe) Reader
- Check MICR reader
- Barcode reader
- RFC Smart card interface
- PIN pad for debit cards

### **Output Devices**

- Receipt printer

### **System Devices**

- 10/100baseT Fast Ethernet connection
- Available USB and serial connections for future expansion

The tollbooth point-of-sale device will function as a cash register for recording sales and redemptions as describe below. Additional functions of the tollbooth point-of-sale device include:

- Display online help
- Display reservations
- Send and receive email
- Send and receive notices and alerts from the Terminal Agent or WSF
- View intranet web pages

The tollbooth point-of-sale device is used in an industrial environment and in direct sunlight. The point-of-sale device will be resistant to dust and splashed water in conformance with level IP52 of IEC standard 60529. The touch screen will be readable in direct sunlight.

The point-of-sale device will provide a display to present the customer with complete details of the transaction including fare and fare components.



The point-of-sale device will maintain copies of pricing and schedule information for off-line operation and store transactions in the event of a network failure for up to 12 hours.

### **Handheld Point-of-sale Equipment**

Terminal ticket-takers, attendants and sellers will use a standard wireless point-of-sale handheld device to sell, void, and refund fares and other sales. Characteristics of the point-of-sale device are as follows.

#### **Standard Equipment**

- Processor, memory and storage

#### **Input Devices**

- Credit card (magnetic stripe) reader
- PIN pad for debit cards
- Check MICR reader
- Barcode reader

#### **Output Devices**

- Receipt printer

#### **System Devices**

- Industry standard wireless protocols (802.11A/B preferred)
- Available USB and serial connections for future expansion

The handheld point-of-sale device will enable sellers and attendants to record sales and redemptions in an industrial environment and in direct sunlight. The device will also be resistant to dust and water—in conformance with level IP54 standard 60529. The handheld screen will be readable in direct sunlight.

### **Direct Sales Functions**

The RCS Enhance extends the direct sales functions described for the RCS Replace (refer to *Alternative Design 1 – Replace* section) with the following additional functions:

### **Fare Determination**

RCS Enhance automates fare determination by using:

- A centrally maintained pricing system
- Multiple fare schedules—such as peak, seasonal, and regular fares—and supports multiple routes (destinations)
- Discount levels for each fare type (driver, adults, children, senior citizens)

The RCS Enhance supports:

- Blanket fares applicable to all locations such as annual and quarterly passes and permits
- Combo transportation fares where the fare applies to services of more than one transit agency
- Temporary or seasonal routes
- The ability to load future fees and fares to point-of-sale devices
- Fees for other services offered by WSF
- Selectively collecting Washington State sales tax on services or fares

## **Sales Functions**

The RCS Enhance extends the RCS Replace direct sales with the following functions:

### **International Routes**

- Collect passenger information (international sailing only)
  - The seller/attendant collects passenger names and identifying information (passport and driver's license numbers, age, etc).
  - The information is recorded on the sailing's vessel manifest.
- Search for reservations
  - The seller uses this function to search for and display Web reservations by customer name, address or vehicle information.

### **Accept Payment**

- Accept WSF charge account slips and charge cards at tollbooth.
- The system scans charge slip account number magnetic stripe, validates the account number and posts sales or refunds transactions against a WSF credit account.
- The RCS Enhance endorses the charge slip on a receipt printer.
- Accept WSF media—vouchers, tickets, or passes
- Accept WSF media (vouchers, tickets or passes) at tollbooth.
- The RCS Enhance scans media serial number barcode, validates the media serial number against the media inventory database.
- The RCS Enhance rejects invalid, used or expired media and tracks the use of valid media in the inventory database.
- Single use media is endorsed on the receipt printer.

## **5.1.2. Self-Service**

The RCS Enhance does not provide automated self-service sales.

### 5.1.3. Web Sales

The RCS Enhance replaces the existing Web sales system and implements Web-based sales of passes and single fares. The available functions include:

#### Web Sales Functions

- Determine the fare based on number and type of passengers
- Sell passes in various denominations
- Sell permits

#### Payment functions

- Credit card payment

#### Finalize Transaction

- Finalize transaction
  - The function finalizes the self-service transaction.
  - The transaction is recorded in the transaction table and a sales receipt page is presented to the customer.

### 5.1.4. Refunds

The RCS Enhance alternative provides the following refund and void functions:

- Refund Cash, Check, Debit or Credit Card
  - This process is used to refund cash, check, debit and credit card single fare transactions.
  - The RCS Enhance records the refund in the transaction database.
- Refund Charge Slips or Media
  - This process is used to refund charge slips or media transactions
  - The RCS Enhance records the refund in the transaction database.

### 5.1.5. Third Party Sales

The RCS Enhance alternative replaces existing third-party sales management tools and spreadsheets. Third-party sales are performed by retailers, ground transport agencies, and by employers for subsidized programs. Support for third-party sales is provided through an easy-to-use, intuitive, and secure Web interface into the RCS Enhance.

## Retailers

The RCS Enhance alternative supports sales of passes through retailers and other pass outlets. Retailer sales functions include:

- Enter Sales
  - The retailer records the sale of passes, including pass serial number and dollar amount.
  - RCS Enhance tracks the revenue of sales recorded by third parties.
  - Serialized media may require activation by the third party through the RCS Enhance third-party sales Web interface.
- The retailer requests additional inventory of passes to sell. (Passes maybe eliminated)
- Process payments
- View retailer sales reports
- View historical sales reports

## Employer Subsidized Pass Program

RCS Enhance supports the sales of employer-subsidized passes. Employer subsidized pass sales functions include:

- Purchase Passes
  - The employer purchases passes for employees.
  - RCS Enhance tracks the revenue and activates the pass.
- View pass sales reports
- View historical sales reports

### 5.1.6. Ancillary Revenue

The RCS Enhance alternative replaces the current ARCS Revenue Accounting functionality. RCS Enhance records, tracks and reports ancillary sales and revenue in the RCS Enhance transaction database. Types of ancillary revenue include:

- Contract revenue
- Hazmat revenue
- Charter revenue
- Cash, credit and charge over/under (till adjustments) from sales
- Miscellaneous revenue
- Deposit forfeitures
- Adjustments

## Ancillary Revenue Functions

The RCS Enhance alternative ancillary sales and revenue functions include:

- Maintain ancillary revenue/sales type
  - Add, change, delete and list types of ancillary revenue.
- Post ancillary revenue data interface
  - Post ancillary sales and commissions from third parties using standard interfaces such as, but not limited to XML, Excel spreadsheet, tab and comma delimited text files.
- Post ancillary revenue data
  - This is an online user interface to post ancillary sales and commissions from third parties.
- Export ancillary revenue to TRAINS
  - Used to create, and maintain and transmit journal transactions to WSDOT accounting system.

## Ancillary Revenue Reporting

Ancillary revenue reporting provides the ability to display, print, and email predefined and custom reports of ancillary revenue data.

The predefined ancillary revenue reports include the following.

- Over/short occurrences by type of sale at terminals
- Sales, commissions and miscellaneous revenue by vendor
- Sales, commissions and miscellaneous revenue by type of sale
- Sales, commissions and miscellaneous revenue by period
- Sales, commissions and miscellaneous revenue by other user defined criteria

## 5.2. Revenue Controls

### 5.2.1. Balancing

The RCS Enhance alternative provides reports for the following data:

- Initial declare
  - The RCS Enhance alternative enables a seller to enter the amount of currency and inventory at the time the seller begins sales shift.
  - The amount is compared to the amount RCS Replace calculates to be in the cash drawer.
  - An over/under receipt is printed.
- Final declare
  - The system enables a seller to enter the amount of currency and inventory at the time the seller ends sales shift.

- The amount is compared to the amount RCS Replace calculates to be in the cash drawer and an over/under receipt is printed.
- Inventory Media
  - The RCS Enhance alternative enables the seller to declare inventory on hand and compares this to the inventory RCS Replace has for the seller.
  - An over/under receipt is printed.

### 5.2.2. Head Office Reconciliation

RCS Enhance provides functions for reconciliation of commercial charge accounts (see section 5.5), inventory (section 5.4) and bank deposit reconciliation.

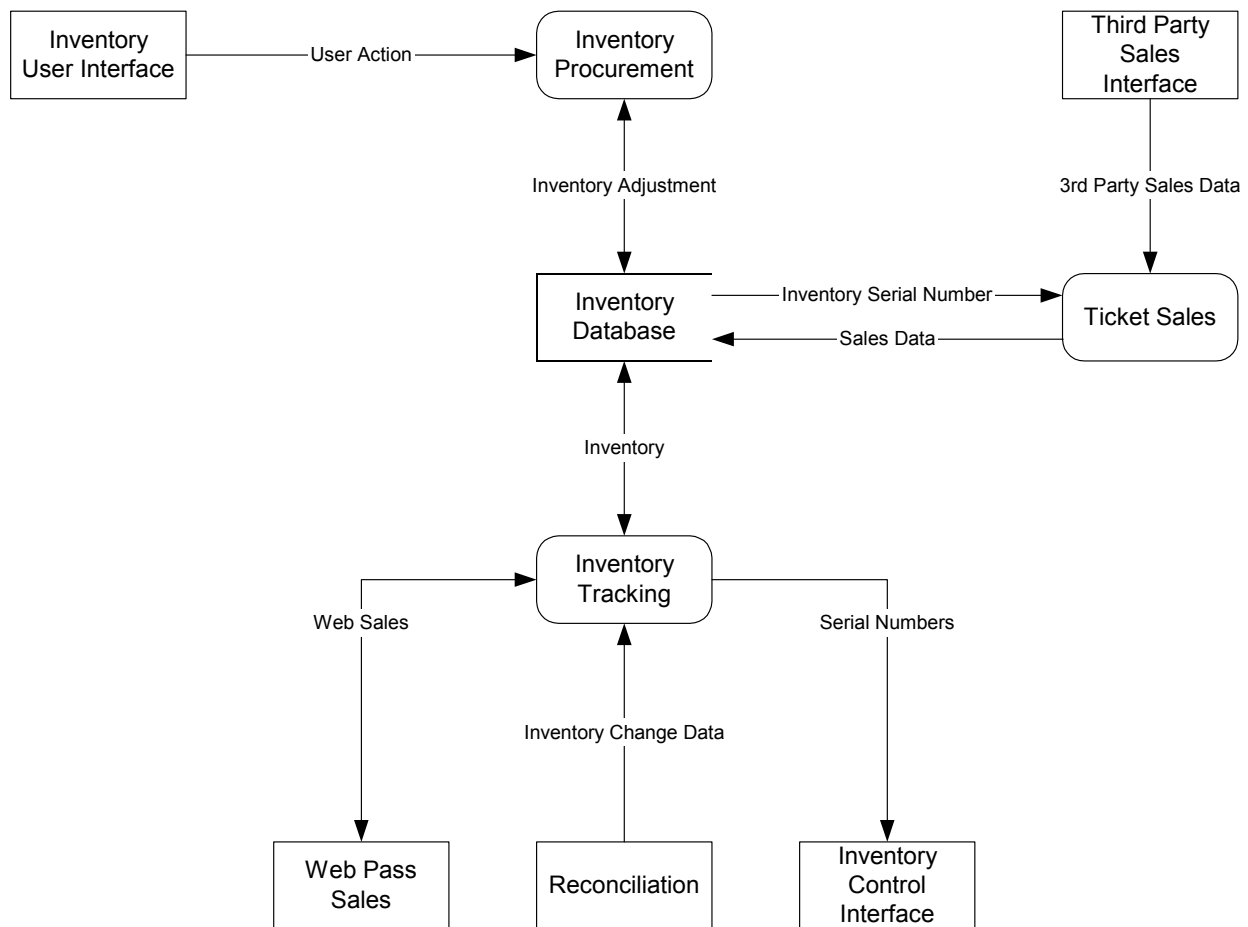
## 5.3. NSF

The RCS Enhance alternative validates checks using a third-party check service. Checks may be processed as electronic funds transfer instruments. Functions to support checks and EFT processing include:

- Personal Check Payments
  - Accept personal check payments at the tollbooth.
  - Routing and account numbers are read with MICR reader.
  - The RCS Enhance verifies the account, displays check acceptance status, and endorses the check on the receipt printer.
  - The system prevents acceptance of a declined check.
- Personal Check Payments
  - Accept personal checks as instruments for electronic funds transfer payments.
  - Routing and account numbers are read with MICR reader.
  - The RCS Enhance processes personal checks.
  - The system voids the check with “Do Not Deposit” on receipt printer.

## 5.4. Inventory

The RCS Enhance Alternative integrates the existing ARCS Inventory Control System. The RCS Enhance Alternative supports a perpetual inventory system to track passes, permits and other controlled media.



**Figure 6: Inventory Data Flow**

Figure 3 illustrates the inventory data flow. The inventory component provides inputs for

- Managing inventory
- Direct sales
- Web sales
- Third-party sales
- Third party inventory
- Inventory reconciliation

### Inventory Database

The inventory database maintains inventory attributes including but not limited to:

- Single pass type with barcode or magnetic stripe
- Media type
- Media description

- Serial numbers
- Route information
- Beginning/expiration dates
- Monetary values
- Reorder levels
- Lead time

### **Inventory Administration**

The RCS Enhance provides the following inventory administration functions:

- Add, change or delete a media types
- List the available media types

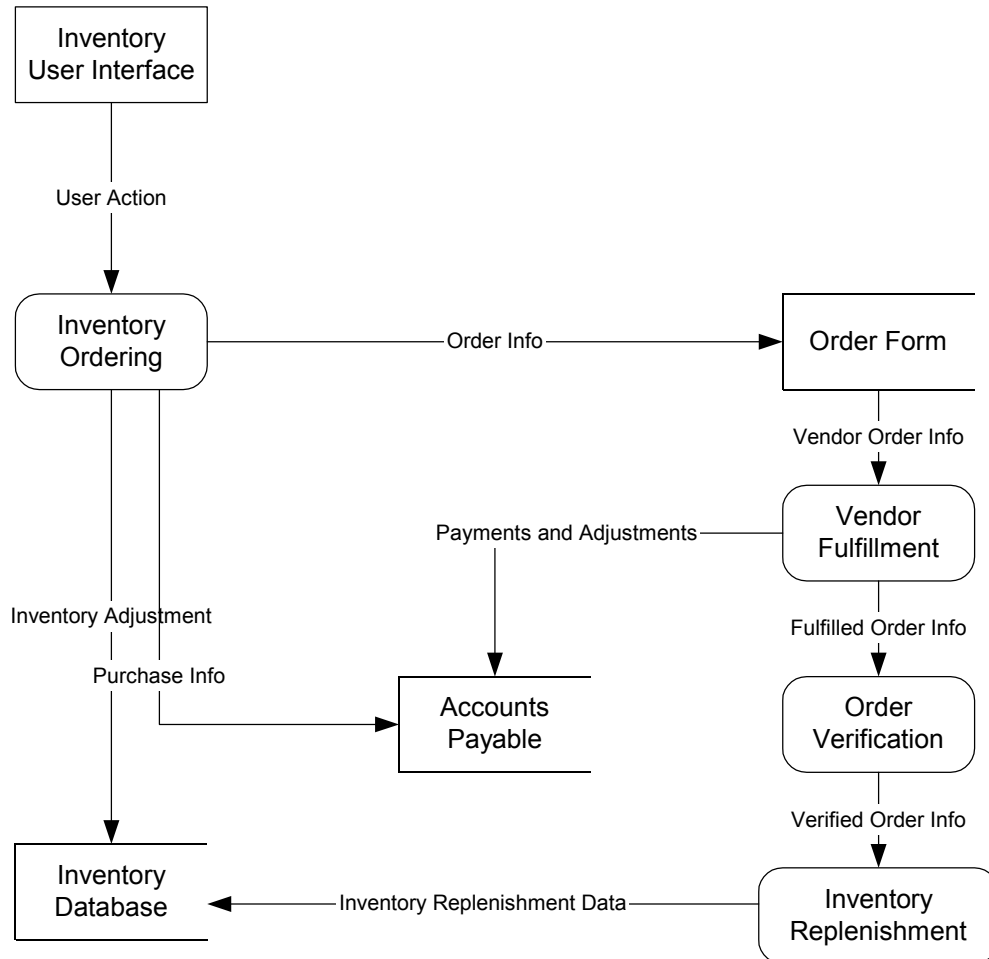
### **Inventory Procurement**

The RCS Enhance inventory component provides the following functions:

- Generate restock orders when supplies fall below specified thresholds
- Process stock receipt of orders increasing stock levels
- Process shipment errors
- Create transactions for TRAINS accounts payable from restock orders



## Inventory Procurement



**Figure 7: Inventory Procurement Data Flow**

Inventory procurement maintains a perpetual inventory of media. As stock is depleted, this component generates order forms, tracks vendor fulfillment and order verification, interfaces with the TRAINS accounts payable system and replenishes the media inventory in the inventory database.

Procurement functions include:

- Manage supplier information
- Manage stock levels
- Create orders
- Verify orders

- Replenish inventory
- Create A/P transactions

### **Inventory Tracking**

The Revenue Collection System inventory component provides the following inventory-tracking functions:

- Track media by serial number
- Track inventory levels and serial numbers at each station or third-party
- Define which media types can be stocked at a given station or third-party
- Define minimum stock levels for each media at a given station or third-party
- Decrement stock levels at stations or third-parties based on sales
- Transfer stock from station to station
- Transfer inventory from terminals or third parties to warehouse for destruction
- Track sales of passes and permits via the web, and third-party sales
- Evaluate station inventory levels to historical sales by sailing, day, week or month
- Increase/decrease stock levels based on sales trends or other WSF established business rules
- Verify receipt at terminal
- Verify shipment online
- Detect and report discrepancies between orders distributed and shipments verified
- Detect and report discrepancies in serial numbers and counts distributed to a station and what was sold
- Report stations needing replenishment
- Track unused inventory returned from third-parties

### **Inventory Reconciliation**

The Revenue Collection System inventory component provides the following inventory reconciliation functions:

- Report of passes sold, distributed to and returned from third parties for a specific period
- Report of passes unsold by third parties
- Report passes by customer
- Report passes returned from administrative services to inventory tracking
- Report passes sold, distributed to and returned from administrative services with web sales and direct sales
- Report of web sales passes sold to passes distributed and returned
- Produce custom reports user-defined data for reconciliation
- Report combo pass sales at a specified terminal(s) for a specified period

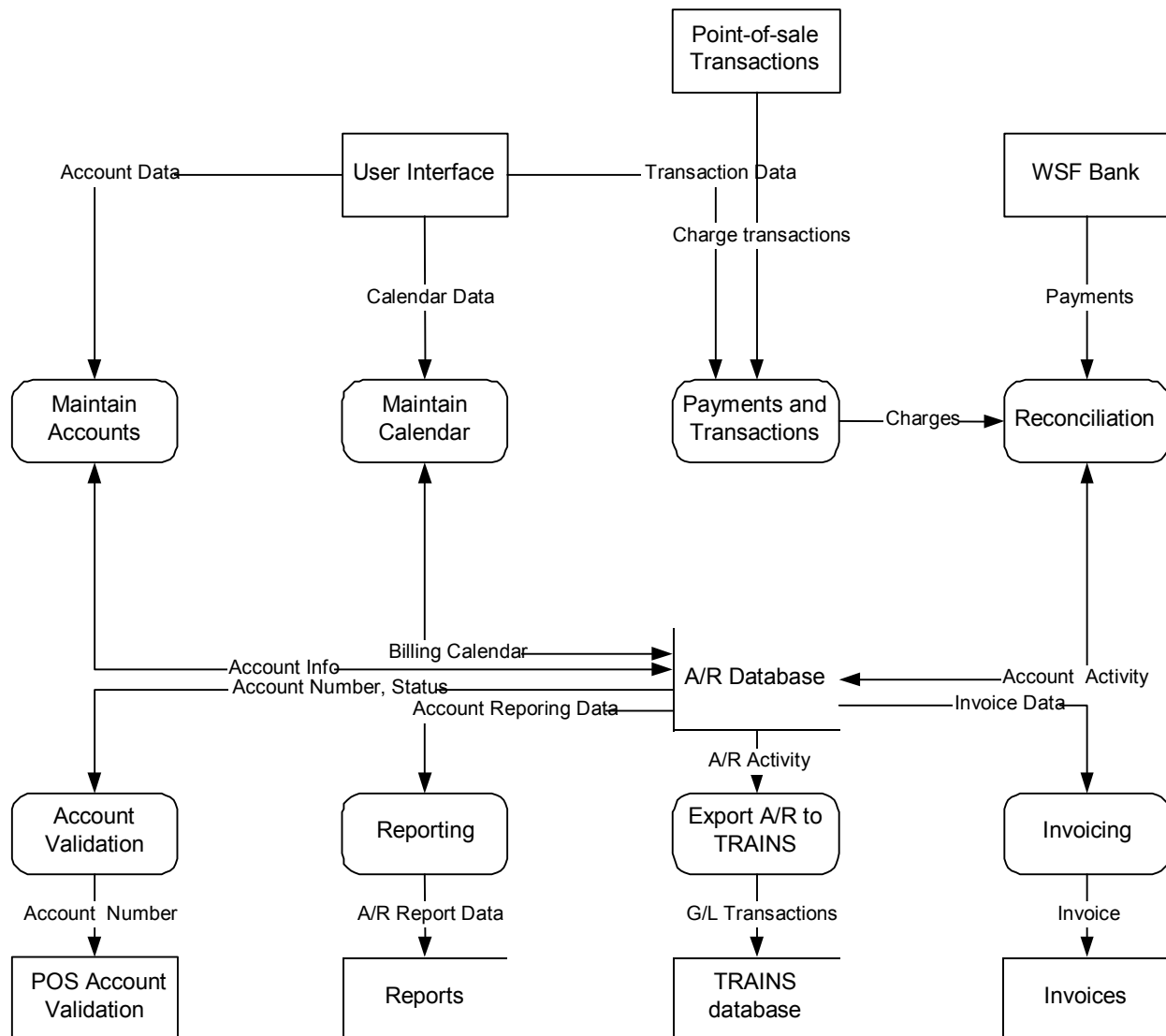
## Inventory Reporting

The RCS Enhance inventory component provides the following inventory reporting functions:

- Station replenishment forecast
- Inventory historical analysis
- Inventory stock trends analysis
- Inventory levels by station and third party
- Order fulfillment packing list
- Fulfillment discrepancy report
- Station sales discrepancy report

## 5.5. Commercial Charge Accounts

The RCS Enhance integrates the existing Advanced AR used for commercial charge accounts. The RCS Enhance commercial charge account functions will enable WSF to provide charge accounts to commercial, governmental, and other organizations. The listed customers use pre-printed charge slips (or other new method – i.e. charge card) to charge fares to their account. The commercial charge account component produces invoices; processes payments received by the bank, includes reporting and reconciliation functions, and uploads detailed account transactions to the WSDOT TRAINS system.



**Figure 8: Commercial Charge Account Data Flow**

Figure 8 illustrates the high-level data flow in the commercial charge account component.

Inputs to the commercial charge accounts component include, but are not limited to:

- User interface for maintaining accounts, accounting calendars and payment and transaction information
- Payments received by WSF's bank
- Charge transactions from direct sales
- Account reconciliation transactions

Outputs include but are not limited to:

- Account number validation interface for direct sales
- Account invoices
- Journal entries to TRAINS
- Reports

### **Commercial Charge Account Information**

The RCS Enhance commercial charge accounts component maintains (but is not limited to) the following customer information:

- Customer account number
- WSDOT TRAINS account number
- Customer contact data
- Company names
- Contact information (names, addresses, telephone numbers and email)
- Alternate contact information
- Alternative or legacy account numbers
- Bank information
- Minimum/maximum account balances
- User defined fields
- Transaction details
- Charge amount
- Date and time
- Route information
- Vehicle information
- Vehicle identification number
- License plate number
- Vehicle characteristics
- Account history
- Payments
- Payment history
- Open invoices
- Audit trail of additions, changes or deletions

### **Account Validation Functions**

The RCS Enhance commercial charge accounts component provides functions for point-of-sale software to validate an account number on a charge slip or charge card in real time, look-up



account information, and record charge transactions on the point-of-sale device. These functions include:

- Validate account number
  - The function validates the account number and provides charge authorization to the point-of-sale device software.
- Search for account
  - The function searches for accounts that match search criteria.
- Post transaction
  - The function records point-of-sale charge transactions described in section.

### **Accounting Calendar**

The RCS Enhance accounting calendars trigger periodic accounting events such as invoicing, payment processing and report generation. The RCS Enhance provides functions to maintain accounting calendars, which include:

- Maintain calendar types
  - Add, change, or delete an accounting calendar type.
- Maintain accounting event types
  - Add, change or delete an accounting event type.
- Maintain calendars
  - Add, change or delete events in an accounting calendar.
- List Accounting calendars
  - The function lists the defined accounting calendars.
- Report accounting calendars
  - The function prints a report of defined accounting calendars.

### **Accounts Receivable Account Management**

The RCS Enhance provides the following account management functions:

- Create account
  - Set up a new customer account. Inputs include (but are not limited to) the commercial charge account information defined under the *Commercial Charge Account Information* heading.
- Update account information
  - Update information about an existing account.
- Delete account
  - Delete an existing account.
- Search for account
  - Search for accounts by name, account number and other user defined search criteria.

## Invoicing

The RCS Enhance provides functions for creating periodic and on-demand invoices for WSF accounts. Invoicing functions include:

- Select account(s)
- Select invoicing cycle or date range
- Print invoices
- Calculate and apply interest charges on past due accounts
- Calculate and apply discounts and premiums based on travel frequency
- Calculate and apply discounts and premiums based on user defined criteria

## Payment Processing

The RCS Enhance provides functions for payments, adjustments and manual transactions to an account. The RCS Enhance accepts payments from WSF's bank lockbox and electronic funds transfer.

Lockbox	WSF's bank processes payments at WSF's lockbox and provides detailed payment information including account number, payment amount and payment date.
EFT	WSF's bank processes EFT payments at WSF's lockbox and provides detailed payment information including account number, payment amount and payment date.

The RCS Enhance payment processing functions include:

- Post payments to specific invoice(s)
- Post payments to oldest open invoice
- Post payment to specific invoice line items
- Post partial payment
- Post multiple payments to invoice or invoice items
- Post payment to multiple open invoices
- Apply overpayments to future invoices

The RCS Enhance stores invoice payments with missing or incorrect account numbers in a suspense account for investigation and processing. The system's suspense account functions include:

- List suspense payments
- Assign suspense payment to account



## **TRAINS Account Interface**

The RCS Enhance provides the WSDOT TRAINS accounting system detailed transactions for all accounts receivable activity.

The TRAINS interface is created and maintained using a third-party legacy application integration broker.

The RCS Enhance/TRAINS functions include:

- Maintain TRAINS G/L accounts
- Assign account
- Create journal entries
- Update TRAINS
- Post customer account charges to TRAINS based on accounting calendar

## **Reconciliation**

The RCS Enhance commercial charge account reconciliation provides the following functions:

- Reconcile charge slips to RCS Enhance transactions
- Reconcile charge accounts to RCS Enhance transaction

## **Reporting**

The RCS Enhance commercial charge account component provides the following standard reports:

- Account information by account name
- Account information by account number
- Account history
- Payment history
- Outstanding invoices
- Aged accounts receivable

## **5.6. Redemption**

The RCS Enhance improves the redemption data capture to provide more accurate sailing statistics and passenger counts. The RCS Enhance alternative enables appropriate revenue collection and recognition when the redemption activity occurs. The RCS Enhance supports the tracking, reporting, and displaying of the space availability, capacity used, and capacity remaining for any given sailing; the information is stored and made available for historical reporting and forecasting purposes.

Redemption is initiated by:

- Seller, ticket taker, terminal attendants
- Smart Card reader

The RCS Enhance redemption processes use information from, but not limited to:

- Pass, permit, and voucher serial numbers
- Preferential loading permit numbers
- RCS Enhance media inventory
- RCS Enhance reservation information

The redemption process updates:

- RCS Enhance transaction database
- Sailing statistics

### **Seller/Attendant Redemption Functions**

- Redeem passes
  - This function enables the attendant to redeem a pass.
  - The RCS Enhance scans media serial number barcode and validates the media serial number against monthly pass media inventory database.
  - The media is validated to ensure fare is appropriate for the route and sailing.
  - The RCS Enhance rejects invalid, used, or expired media, and tracks the use of valid media in the inventory database.
- Redeem single-use fare ticket, voucher, certificate or prepaid ticket media
  - This function enables the attendant to redeem a single-use fare ticket, voucher, certificate or prepaid ticket media.
  - The RCS Enhance scans media serial number barcode and validates the media serial number against the media inventory database.
  - The media is validated to ensure fare is appropriate for the route and sailing.
  - The RCS Enhance rejects invalid, used, or expired media and tracks the use of valid media in the inventory database.
  - Single use media are endorsed on the receipt printer.

## **5.7. Reservations**

The RCS Enhance alternative does not provide a component to manage reservations. The RCS Enhance integrates with the existing WSF Space Reservations system to display reservations information on the point of sale devices.

### 5.7.1. Reservation Process

In addition to existing reservations functionality, additional functionality includes:

- View routes, schedules and fares
- View reservation names, vehicle information, dates
- View deposit payment information
- Automatically apply reservation deposit to payment transaction

### 5.7.2. Preferential Loading

The RCS Enhance alternative does not provide a component to manage preferential loading. RCS Enhance integrates with the existing WSF Space Reservations system to display any preferential loading data maintained on that system on the point of sale devices.

## 5.8. Vessel Manifest and Sailing Statistics

### 5.8.1. Vessel Manifest

The RCS Enhance alternative does not provide a real-time vessel manifest for each sailing of each vessel.

### 5.8.2. Staging

The RCS Enhance does not automate staging.

### 5.8.3. Sailing Statistics

The RCS Enhance calculates sailing statistics from manual and automated redemption. The sailing statistics define:

- Vessel name and class
- Sailing date and time
- Scheduled date and time
- Route – departure and destination terminals
- Number of passenger positions not redeemed
- Number of passenger positions unsold
- Number of passengers on board
- Number of vehicles positions not redeemed
- Number of vehicles positions unsold
- Number of vehicles on board

The sailing statistics will be viewable by vessel personnel, departure and destination Terminal Agents, attendants and sellers, and WSF's public affairs office. Sailing statistics maintain a history of all prior sailings for analysis.

### **Sailing Statistics Functions**

- Display sailing statistics
- Update statistics
- Set sailing time

## **5.9. Reporting**

The RCS Enhance provides predefined, custom, and ad hoc reporting capabilities using standard reporting products.

### **5.9.1. Management Reporting**

Management reporting functions are substantially the same as in the RCS Replace system.

### **5.9.2. Data Warehousing**

The RCS Enhance data warehouse is fully integrated with commercial accounts, inventory management and sailing statistics.

## **5.10. Technical**

### **5.10.1. Information Tracking**

The RCS Enhance assigns unique identification numbers to all transactions, transaction line items and system and domain (lookup) information. This function permits all RCS Enhance information to be uniquely identified, tracked and viewed over time.

### **5.10.2. Change Tracking**

The RCS Enhance Alternative tracks all changes to all information in its audit log; tracked changes include:

- The field added, changed, or deleted
- The old values of changed or deleted information
- The identity and role of the user initiating the addition, change or deletion
- The date and time of the addition, change or deletion

The RCS Enhance provides controls to configure the duration the audit log is retained and to purge information that is no longer needed.

## 6. ALTERNATIVE DESIGN 3 – BEST PRACTICES (RCS FOUNDATION)

The Best Practices (RCS Foundation) alternative represents the Sierra Systems Project Team's recommendations for the Revenue Collection System. The Best Practices option is the most suitable alternative to meet the project goals and objectives. The following section describes the recommended Washington State Ferries Revenue Collection System. This system implements the key recommendations of the Sierra Systems Project Team.

The functionality of RCS Best Practices alternative is derived from RCS Enhance alternative and includes the following key changes:

- Checks, commercial charge transactions are eliminated and printed media are replaced
- Redemption and confirmation are fully automated where feasible
- Sailing statistics are accurate and available in real-time
- Manual processes such as NSF tracking and charge account reconciliation are largely eliminated
- Audit issues mostly resolved
- Internal controls are improved
- Debit card and electronic signatures

In the current environment implementing the recommended alternative – Best Practices (RCS Foundation)– will be most readily accomplished by separating this into two major components, RCS Foundation Step One and Step Two. It is our expectation that the elements embodied in RCS Foundation Step One can be implemented at all sites. Elements of RCS Foundation Step Two may require extensive contract negotiations and/or significant capital expenditures.

The RCS Best Practices alternative will implement the following initiatives in Step 1:

- **Update POS technology in the tollbooth.** Replacement of this technology is necessary because it is physically failing and cannot be integrated with newer technologies.
- **Consolidate all WSF revenue and RCS transactions into one application,** with consistent processes and appropriate internal controls, thereby ensuring that data is auditable, reporting is backed by verifiable information and decision making can be based on supportable assumptions. This will also include those transactions initiated by Contract Agents, Third Party Sellers and Concessionaires.
- **Establish clear redemption processes.** Consistent redemption processes allow for a future confirmation of recorded sales, sailing statistics and banking deposits.
- **Capture and maintain the detail for all types of RCS transactions electronically.** Such detailed data will support detailed matching, automated reconciliation and allow for a more appropriate segregation of duties.
- **Augment existing reporting tools with an integrated financial application (G/L, Reporting Tools).** Enhance reporting will support improvements in expenditure control and provide better management as well as operational reporting.

- **Expand the use of alternative forms of payment**, promoting such instruments as debit card, WSF card, credit card or e-check.
- **Provide access to reservation data in the tollbooth.** Integrated RCS and reservation data will improve throughput and customer satisfaction.
- **Prepare WSF for integration with external transit organizations.** During RCS Foundation Step One, WSF will prepare the RCS technology for integration with the Regional Fare Coordination System beta tests.
- **Prepare for the automation of revenue transactions.** Fares will be defined in a way that can be determined by a system-driven, rules-based fare structure. Concurrent with the RCS Foundation Step One implementation, planning for system wide automation will be undertaken, including planning for appropriate modifications to facilities and infrastructure.
- **Allow for the elimination of charge accounts for commercial traffic.** Phasing out such services would reduce manual processing and eliminate receivables functionality from RCS.
- **Allow prepaid media to be tracked as they are redeemed.** Scanning prepaid media during the redemption process will allow for immediate validation and verification as well as provide support for the automation of fare determination and reporting of fare revenue. Once the media has been scanned, it can be electronically cancelled. Physical controls are more easily instituted and the tracking and reconciliation of inventory can be done online.

The RCS Best Practices alternative will introduce the following initiatives in Step 2:

- **Establish confirmation points for all sales and redemptions.** Confirmation points (Turnstiles, Face Counters and Vehicle Counters) will enable verifiable revenue controls. This will address the failings in accountability in the existing POS system. All redemptions can be confirmed and would be auditable. The output from the redemption processes, supported by the results derived at the confirmation point, will verify that all revenue is collected and reported and that opportunities for fraud are reduced. Data can be confirmed as being complete and accurate. Data from sales, redemption and from the confirmation points can be combined for reconciliation purposes.
- **Establish fare confirmation as the primary task for the Ticket Seller.** The introduction of automated Vehicle Metrics Equipment for classification of all vehicles will change the historical role of the Ticket Seller.
- **Complete the integration of WSF with external transit organizations.** During RCS Foundation Step Two, WSF will complete the preparation of the RCS technology for integration with the Regional Fare Coordination System (Smart Card) and the Tacoma Narrows Toll Bridge Toll Collections Systems. This will ensure WSF functionality will align with regional transit processes/capabilities.
- **Establish a firm transaction cutoff.** A reasonable cutoff time will increase the window for communication, improve on-time sailings, as well as address safety concerns in the loading area and in the loading process. Following the cutoff time tickets would be sold for the next available sailing.
- **Introduce self-service (kiosk) functionality for select transactions.** Concurrent with RCS Foundation Step Rollout of kiosk based self-service functionality; appropriate modifications to facilities and infrastructure must come online as each terminal goes live on RCS Foundation.

- **Introduce real-time communication with Customers.** Real-time information such as sailing schedule and wait times should be provided through multiple interfaces to the Customer will improve overall satisfaction levels (Web, Reader Boards).

**Best Practices (RCS Foundation) is the most suitable alternative to meet the project goals and objectives. The Sierra Systems Project Team recommends the Best Practices (RCS Foundation) alternative for the RCS Project Phase II—replace the existing POS environment with current technology while eliminating Commercial Charge Activity, Prepaid Media, and ceasing to accept checks for any transactions occurring at the tollbooth.**



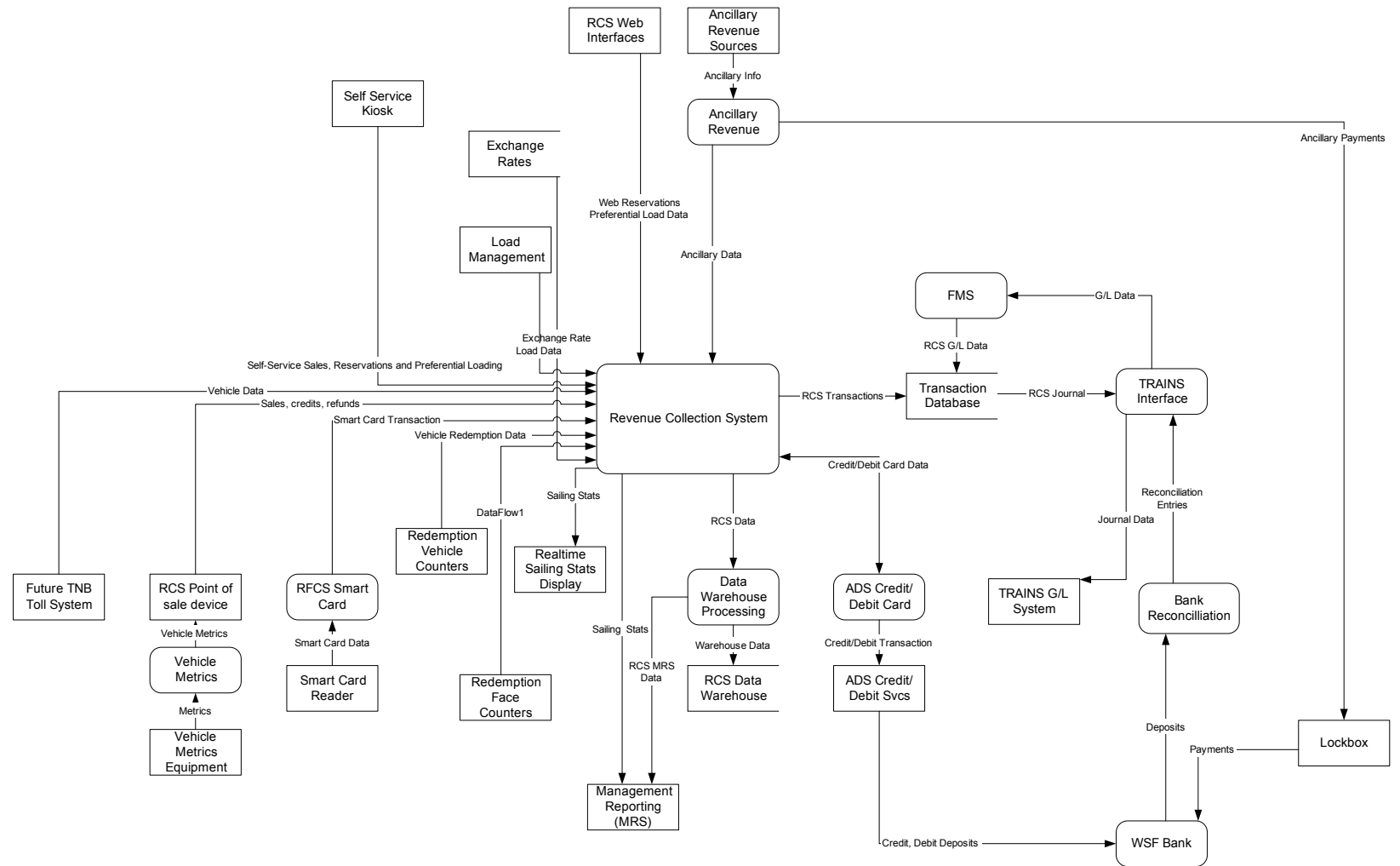


Figure 9: RCS Best Practices Data Flow Diagram

The RCS Best Practices provides the services outlines below or integrates with the following external systems:

Reservations	RCS Best Practices replaces the existing WSF Space Reservations system with new online reservations and preferential loading functionality. Web reservations are fully integrated with sales, redemption, and vessel manifesting and reporting.
Web Pass Sales	RCS Best Practices replaces the existing Web sales system with a new application and provides an online sales system for single fares. RFCS Smart Cards replace WSF passes in Step 2. Web Sales is fully integrated with redemption, vessel manifesting, and sailing statistics and reporting.
Credit Card Processing	RCS Best Practices extends credit card processing to include debit cards. Reconciliation and reporting is fully integrated.
WSDOT TRAINS G/L	RCS Best Practices is fully integrated with the existing WSDOT accounting system, TRAINS, using third-party integration brokers to manage posing of G/L transactions.
Commercial Charge Accounts	RCS Best Practices eliminates commercial charge accounts.
Ancillary Revenue	RCS Best Practices tracks and manages revenue from ancillary activities such as HAZMAT sailings and vessel charters.
Reconciliation	RCS Best Practices provides fully automated reconciliation of sales, redemption and confirmation of redemption, bank deposits and credit and debit card transactions.
Electronic Funds Transfers	RCS Best Practices eliminates electronic funds transfer, as personal checks are no longer accepted.
Media Inventory	RCS Best Practices replaces the existing ARCS inventory system with an integrated, perpetual inventory system in Step 1 and phases out all media in Step 2.
Negative Checks	RCS Best Practices eliminates negative check verification, as personal checks are no longer accepted.
Exchange Rates	RCS Best Practices implements setting of foreign currency exchange rates from electronic sources.
RFCS Smart Cards	RCS Best Practices fully integrates with the RFCS Smart Card system.
Self-Service	RCS Best Practices implements self-service sales of fares using self-service kiosks and Web-based sales. (Introduced with RFCS)
Direct Sales	RCS Best Practices provides an online point-of-sale mechanism to support fare determination and sales at ferry terminals. The point-of-sale device automatically determines vehicle characteristics such as height and length for automatic determination of over height or over length surcharges.
Vessel Manifesting	RCS Best Practices automatically tracks passenger information for automatic generation of vessel manifests. RCS Best Practices automatically determines the number of passenger and vehicle boarded using passenger and vehicle counting technology.
Future Sales and Redemption	RCS Best Practices provides interfaces for future sales and redemption technology such as the Tacoma Narrow Bridge toll system.

## 6.1. Sales

The RCS Best Practices direct sales at terminals consist of three high-level functions:

- Selling of fares
- Automated redemption of fares and reservations
- Processing of refunds/voids/reversals

The RCS Best Practices encourages self-service. In Step 2, self service Kiosks placed near terminals will enable the passenger to purchase single fares. Web-based sales of single-fares will extend self-service capabilities of the RCS Best Practices and move sales away from the terminal.

Passengers requiring assistance will purchase fares at the tollbooth. Direct sales will be initiated using the RCS Best Practices point-of-sale device. Sales will be automatically redeemed

- At the tollbooth (walk on and vehicles)
- Using automated turnstiles for walk-on passengers
- Using RFCS Smart Card redemption devices
- Using TNB transponders at the tollbooth

The RCS Best Practices Step 2 enables redemption to be automatically confirmed using technology such as:

- Automated vehicle counters
- Automated passenger face counters

Automated confirmation of redemption provides accurate sailing statistics. Accurate counts of passengers and vehicles aboard, or boarding the sailing, enable real-time display of sailing statistics and real-time confirmation of sales. Enhance redemption will enable informing passengers whether or not they can board a given sailing. It will also provide WSF Internal Control and the Washington State Auditor the capability to track sales to bank deposits, confirm sales to passenger and vehicle loading, and compare bank deposits to expect revenues based on confirmed redemption.

The RCS Best Practices sales processes implement the Sierra Systems Project Team's recommendations by:

- Eliminating paper checks as a form of payment
- Replace pre-printed media
- Eliminating commercial charge accounts

### 6.1.1. Direct Sales

#### Direct Sales Equipment

The RCS Best Practices system simplifies the point-of-sale equipment for the RCS Enhance solution—described in the *Alternative Design 2 – Enhance* section. Since the RCS Best Practices does not accept personal checks or commercial charge accounts as forms of payment, the point-of-sale device no longer requires MICR readers for check processing.

The RCS Best Practices Step 2 uses electronic devices to support automated fare determination and redemption confirmation at each terminal: vehicle measurement equipment to measure factors like vehicle length, width, height and weight; the computerized face counter for confirming walk-on passenger counts; and a vehicle counter for confirming vehicle redemption. These components are described below in more detail.

#### Toll Booth Point-of-Sale Equipment

Terminal sellers will use a standard point-of-sale device that is essentially the same as the one described for RCS Enhance. The equipment does not require MICR check readers since checks are no longer accepted. Bar code readers are used to validate media in Step 1 and are retained after media is phased out in Step 2 to validate bar coded single-use fare receipts printed from kiosks or the Web. Characteristics of the RCS Best Practices point-of-sale device are described below.

#### Standard Equipment

- Processor, memory and storage
- Flat panel touch screen/tablet
- Customer display screen for presentation of full transaction details
- Standard keyboard and mouse
- Cash drawer

#### Input Devices

- Credit Card (magnetic stripe) reader
- Interface for equipment to measure vehicle characteristics—height, length, width, and weight
- RFC Smart Card interface
- PIN pad for debit cards
- Signature capture device
- Bar code readers
- Transponder reception device

#### Output Devices

- Receipt printer

### **System Devices**

- 10/100 baseT Fast Ethernet connection
- Available USB and serial connections for future expansion

The tollbooth point-of-sale device will function as a cash register for recording sales and redemptions. Additional functions of the tollbooth point-of-sale device include:

- Display online help
- Display real-time sailing statistics and manifest information (passenger and vehicle capacity, number of positions sold)
- Display reservations
- Send and receive email
- Send and receive notices and alerts from the Terminal Agent or WSF
- View Intranet Web pages

The tollbooth point-of-sale device will be used in an industrial environment and in direct sunlight. The point-of-sale device will be resistant to dust and water—in conformance with level IP52 of IEC standard 60529. The touch screen will be readable in direct sunlight.

The point-of-sale device will provide a display to present the customer with complete details of the transaction including fare and fare components.

The point-of-sale device will maintain copies of pricing and schedule information for off-line operation, and stores transactions in the event of a network failure for up to seven days.

### **Handheld Point-of-sale Equipment**

Terminal ticket-takers, attendants and sellers will use a standard wireless point-of-sale handheld device to sell, void, and refund fares and other sales. Characteristics of the RCS Best Practices point-of-sale device include:

### **Standard Equipment**

- Processor, memory and storage

### **Input Devices**

- Credit card (magnetic stripe) reader
- PIN Pad for debit cards
- Smart Card reader

### **Output Devices**

- Receipt printer

### **System Devices**

- Industry standard wireless protocols (802.11A/B preferred)

The handheld point-of-sale device will enable sellers and attendants to record sales and redemptions, and function properly in an industrial environment and in direct sunlight. The device will be resistant to dust and water in conformance with level IP54 of IEC standard 60529. The handheld screen will be readable in direct sunlight.

### ***Vehicle Metrics Equipment***

The tool will measure physical characteristics of a vehicle at the tollbooth, including the vehicle height, width, length and weight. The information will then be electronically entered into the point-of-sale device using industry standard interfaces, such as USB, RS-232, or the Ethernet.

### ***Sailing Information Billboard***

The sailing information billboard is a large electronic display device. The sailing information billboard is confirmed and validated in real-time using the RCS Best Practices automated confirmation of redemption (see below). The content of the display will be programmable and customized to display information specific to each terminal.

### ***Vehicle Counting Equipment***

This device will count vehicles at the latest possible point during the boarding process. Vehicle counts will be used to confirm vehicle redemption information, and will improve the internal controls, auditability, and vessel manifest/sailing statistics related to vehicle counts.

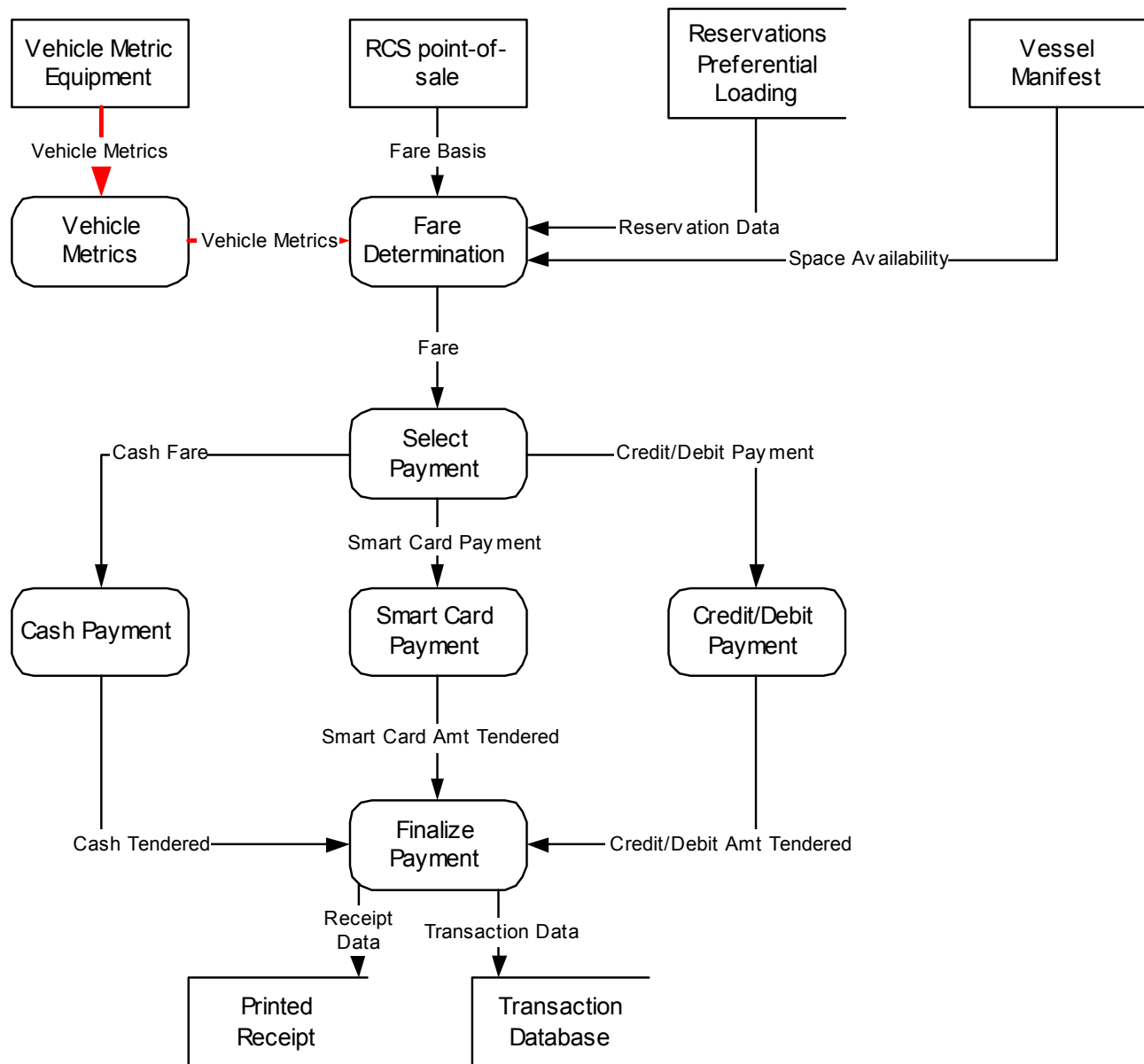
### ***Face Counting Equipment***

The face counting device will count the number of passengers boarding, at the latest possible point during the boarding process. The obtained data will be used to confirm passenger redemption information, and will improve the internal controls, auditability, and vessel manifest/sailing statistics of the count of pedestrians boarding the vessel.

### ***Automated Turnstiles***

The automated turnstiles will control passenger access to boarding areas. The RFCS Smart Card readers will manage turnstile response: validated cards will be redeemed and access will be granted for a single passenger. Invalid cards, or cards with insufficient fare will be denied and passenger access will not be permitted.

## Direct Sales Functions



**Figure 10: Direct Sales Data Flow Diagram**

The RCS Best Practices extends and enhances the direct sales functions describe for the RCS Enhance.

## Fare Determination

The RCS Best Practices provides the same fare determination functionality as described for RCS Enhance alternative:

- A centrally maintained pricing system
- Multiple fare schedules such as peak, seasonal, and regular fares and supports multiple routes (destinations) from the terminal
- Discount levels for each fare type (driver, adults, children, senior citizens)
- Electronic equipment measures the vehicle characteristics for over height and over length surcharges
- Blanket fares applicable to all locations such as annual and quarterly passes and permits
- Combo transportation fares where the fare applies to services of more than one transit agency
- Temporary or seasonal routes
- The ability to load future fees and fares to point-of-sale devices
- Fees for other services offered by WSF

## Sales Functions

The RCS Best Practices extends RCS Enhance sales functions, including:

### Availability and Boarding

- Enforced sailing cutoff
  - The RCS Best Practices disables sales for passage on a sailing at a WSF determined time prior to the sailing. The customer would purchase a ticket for the next available sailing.
  - Cutoff may vary by sailing, season, time of day and other factors such as security checks.
- Display space available
  - Accurate confirmation of redemption provides accurate sailing statistics.
  - Display available space information on point-of-sale devices and sailing information billboards.
- Collect passenger information
  - This function is used by the seller/attendant to collect passenger names and identifying information for international passengers (passport and driver's license numbers, age, etc).
  - The information is then recorded on the sailing's vessel manifest.
- Automated staging and lane assignments
  - Automated redemption, confirmation and sailing cutoff enables RCS Best Practices to automate vessel staging and vehicle loading.
  - The RCS Best Practices makes staging area lane assignments and processes priority customers.



### **Accept Payment**

The RCS Best Practices accepts the following payment types:

- Credit card payment
- Debit card payment
- Cash in United States and Canadian currency (calculating the exchange rates as required and correctly determining the change in USD)
- RFCS Smart Card
- Future payment systems (the RCS Best Practices provides interfaces for automated processing of fares using future systems such as the Tacoma Narrows Bridge system)

#### **6.1.2. Self-Service**

The RCS Best Practices alternative supports self-service sales transactions through a customer self-service kiosk. The kiosk offers an intuitive, easy-to-use interface for entering transactions; it accepts cash, credit card and debit card payments and offers Smart Card redemption.

### **Self-Service Functions**

The RCS Best Practices alternative implements the following self-service functions:

- Make a reservation on a scheduled sailing on a given route
- Fare determination

Determine the fare based on number and type of passengers (adults, children, seniors, etc) and vehicle characteristics.

- Sell single-use fare tickets

### **Process payments**

The RCS Best Practices accepts payment for fares using

- Credit card payment
- Debit card payment
- Smart Card
- TNB Transponder

The RCS Best Practices finalizes self-service transactions by

- Printing a sales receipt (including sailing information, lane assignment, and fare information)
- Updating sailing statistics

### 6.1.3. Web Sales

The RCS Best Practices replaces the existing Web sales system and implements Web based sales of single fares. The provided functions include:

#### Web Sales Functions

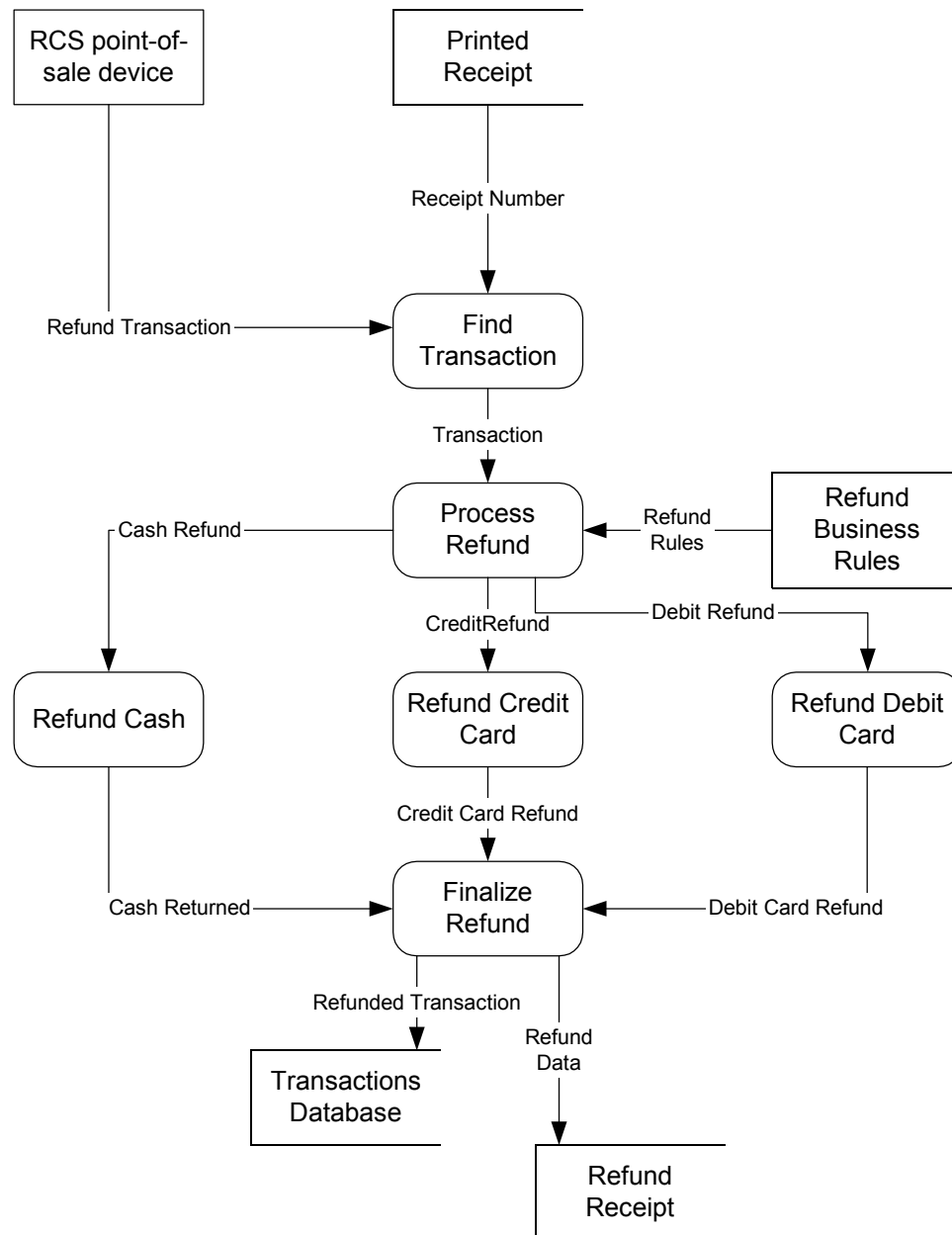
- Display routes, fares and sailing options
- Display wait times and next available sailings
- Determine the fare based on number and type of passengers (adults, children, seniors, etc) and vehicle characteristics
- Sell permits
- Sell single-use fare

#### Payment Functions

- Credit card payment

#### Finalize Transaction

- Finalize transaction
  - This function finalizes the self-service transaction.
  - The transaction is recorded in the transaction table, the vessel sailing manifest table is updated and a sales receipt page is presented to the customer.



**Figure 11: Refund Data Flow Diagram**

Figure 11 illustrates the processing and data flows for transaction void and refund functions, as described below.

#### 6.1.4. Configure Refund

This function permits the system administrator to configure refund processing. Refund options include but are not limited to:

- Time limit after sale
  - Point-of-sale location (limit refunds to specific point-of-sale locations at a terminal)
  - Permit/Deny refunds at a terminal
  - Permit/Deny refunds at WSF's head office
- Refund Cash, Check, Debit, Credit Card, Smart Card or Transponder
  - This process is used to refund cash, check, credit card, and debit card single fare transactions.
  - The RCS Best Practices alternative ensures the transaction is eligible for a refund—based on WSF policies outlined under *Configure Refunds*—reverses the transaction, and prints a refund receipt.
  - The RCS Best Practices alternative records the refund in the RCS Best Practices database and updates the vessel manifest and sailing statistics.

#### 6.1.5. San Juan Islands and Sydney B.C. Contract Terminals

The RCS Best Practices will record revenue from Contract Terminal sales. Currently contract sales and fare collection are manual processes. Contract Sales under RCS will be integrated and handles the same as a WSF operated terminal.

#### 6.1.6. Third Party Sales

The RCS Best Practices will record revenue from Retailer sales of passes during Step 1. Third party revenue functions are equivalent to those of RCS Enhance during Step1 and are phased out with the Smart Card implementation during Step 2.

##### Retailers

The RCS Best Practices alternative supports sales of smart Cards through retailers and other outlets. Retailer sales functions include:

- Enter Sales
  - The retailer records the sale of Smart Card, including serial number and dollar amount.
  - RCS Best Practices tracks the revenue of sales recorded by third parties.
  - Serialized media may require activation by the third party through the RCS Best Practices third-party sales Web interface.
- The retailer requests additional inventory to sell.
- Process payments
- View retailer sales reports
- View historical sales reports

## **Employer Subsidized Pass Program**

RCS Best Practices supports the sales of Smart Card based employer-subsidized passes. Employer subsidized pass sales functions include: (This functionality may be provide through the Regional RFCS project)

- Purchase Passes
  - The employer purchases passes for employees.
  - RCS Best Practices tracks the revenue and activates the pass.
- View pass sales reports
- View historical sales reports

### **6.1.7. Ancillary Revenue**

The RCS Best Practice Alternative replaces the current ARCS Revenue Accounting functionality. RCS Best Practices system records, tracks and reports ancillary sales and revenue in the RCS Best Practice Alternative transaction database. Types of ancillary revenue include:

- Revenue from concessionaires
- Contract revenue
- Hazmat revenue
- Charter revenue
- Cash, credit and charge over/under (till adjustments) from sales
- Miscellaneous revenue
- Sales of surplus/salvage capital equipment
- Deposit forfeitures
- Adjustments
- Capital disposal
- Application, copy and other fees

## **Ancillary Revenue Functions**

The RCS Best Practice alternative ancillary sales and revenue functions include:

- Maintain ancillary revenue/sales type
  - Add, change, delete and list types of ancillary revenue.
- Post ancillary revenue data interface
  - Post ancillary sales and commissions from third parties using standard interfaces such as, but not limited to XML, Excel spreadsheet, tab and comma delimited text files.
- Post ancillary revenue data
  - This is an online user interface to post ancillary sales and commissions from third parties.

- Export ancillary revenue to TRAINS
  - Used to create, and maintain and transmit journal transactions to WSDOT accounting system.

### **Ancillary Revenue Reporting**

Ancillary revenue reporting provides the ability to display, print, and email predefined and custom reports of ancillary revenue data.

The predefined ancillary revenue reports include the following.

- Over/short occurrences by type of sale at terminals
- Sales, commissions and miscellaneous revenue by vendor
- Sales, commissions and miscellaneous revenue by type of sale
- Sales, commissions and miscellaneous revenue by period
- Sales, commissions and miscellaneous revenue by other user defined criteria

## **6.2. Revenue Controls**

The RCS Best Practices extends the revenue controls provided by RCS Enhance and automates revenue reconciliation with the elimination of printed media and commercial charge accounts.

### **6.2.1. Balancing**

Automated redemption and confirmation of sales enable the RCS Best Practices to automatically balance:

- Terminal sales to terminal deposits
- Terminal sales to vehicle and passenger redemption.
- Vehicle counters and passenger face counters automatically confirm passenger and vehicle counts and the numbers are used to balance to sales and redemption.
- Vehicle and passenger counts for sailings from a terminal, for a given day, will predict within a margin of error the expected bank deposits.

Automated redemption and confirmation will enable the RCS Best Practices to enhance sales balancing by focusing end-of-shift balancing on tollbooth, and not on an individual seller. Managing float at a tollbooth will enable WSF's to reduce the amount of working funds allocated to each terminal.

### **6.2.2. Head Office Revenue Reconciliation**

The RCS Best Practices provides improved revenue reconciliation:

- Reconciling deposits to sales

- Reconciling sales to redemption
- Reconciling of Smart Card sales
- Confirming redemption using automated counting mechanisms
- Statistically validating deposits to confirmed redemption
- Automatically reconciling cash deposits, credit and debit card settlements, and WSDOT bank sweeps with WSF's Bank balance

The RCS Best Practices enables manual adjustments to deposit and reconciliation information.

### 6.3. NSF

The RCS Best Practices does not accept checks for payment and does not require NSF functionality.

### 6.4. Inventory

The RCS Best Practices includes the same Inventory management component as detailed in RCS Enhance. The Inventory component is phased out once media is eliminated in Best Practices Step 2.

### 6.5. Accounting Calendar

The RCS Best Practices accounting calendars trigger periodic accounting events such as TRAINS data extract, warehouse updates and report generation. The RCS Best Practices provides functions to maintain accounting calendars, which include:

- Maintain calendar types
  - Add, change, or delete an accounting calendar type.
- Maintain accounting event types
  - Add, change or delete an accounting event type.
- Maintain calendars
  - Add, change or delete events in an accounting calendar.
- List Accounting calendars
  - The function lists the defined accounting calendars.
- Report accounting calendars
  - The function prints a report of defined accounting calendars.

## 6.6. Commercial Charge Accounts

The RCS Best Practices does not process commercial charge accounts; there is no commercial account component in this system.

## 6.7. Redemption

The RCS Best Practices extends and automates redemption functions as follows.

- Redeem Smart Card transactions
  - The RCS Best Practices accepts prepaid Smart Card transactions.
- Kiosk Transactions
- Automated vehicle redemption
  - The RCS Best Practices uses automated vehicle counters to confirm the number of vehicles boarded.
  - The process counts axles as the vehicles board a sailing.
  - The numbers are used to confirm the sale of vehicle fares.
- Automated Face counters
  - The RCS Best Practices confirms the numbers of walk-on passengers using automated passenger face counters.

## 6.8. Reservations

The RCS Best Practices replaces WSF's Space Reservations application with an integrated Web Reservations system.

Functions of the reservations component include:

- View routes, schedules and fares
- View space availability
- Make reservation
- View reservations information
- Cancel reservation
- Make reservation payment
- Reservation reconciliation



### 6.8.1. Reservation Process

The RCS Best Practices reservations component provides the following functions:

- Reservations and advance passage are tracked in vessel manifesting and decrease the space available for the sailing.
- The RCS Best Practices records the reservation and advanced booking against the space available for a given sailing to maintain real-time statistics, predict available space and prevent overselling of routes.

### 6.8.2. Preferential Loading

Preferential loading is used by vessel staging to complete lane assignments, by redemption to determine if vehicle meets loading requirements, and by fare determination for committed vehicle characteristics.

#### Maintain Preferential Loading Classes

Some preferential loading classes have precedence over others. For example, emergency vehicles will be accommodated in preference over HOV vehicles. These functions name and associate a priority for preferential loading classes.

- Define a new preferential loading class and set its priority relative to other classes
- Change a preferential loading class and set its priority relative to other classes
- List class members
- Delete class

#### Maintain Preferential Loading Commitments

These functions create, maintain or delete preferential loading commitments.

- Create a new preferential loading commitment
- Change an existing preferential loading commitment
- Delete an existing preferential loading commitment
- List commitments
- Search for commitments

#### Preferential Loading Reporting

Preferential loading reporting provides the ability to display, print and email predefined and custom reports of preferential loading.

Predefined reports include but are not limited to:

- Preferential loading permits, sorted alphabetically by name
- Preferential loading permits, sorted alphabetically by vehicle license number

- Preferential loading permit usage by period
- Preferential loading permit usage by sailing

The RCS Best Practices Step 2 preferential loading component provides the following functions:

- Potential Preferential Loads
  - The RCS Best Practices enables WSF's to predict and reserve space for preferential loads, based on past preferential loading statistics.
- Preferential Load Tracking and Maintenance
  - Track preferential loads and report on travel patterns and usage.

## 6.9. Vessel Manifest and Sailing Statistics

### 6.9.1. Vessel Manifest

The RCS Best Practices Step Two (non International Sailings) maintains a manifest for the sailing of each vessel. The vessel's capacity reflects the number of passengers, vehicle positions sold, and the number of positions boarded. The vessel capacity information is updated in real-time as fares are sold and redeemed. Each vessel has unique characteristics determining the number of passengers allowed to board and the numbers and types of vehicles stowed on deck.

The vessel manifest is viewable by vessel personnel, departure and destination Terminal Agents, attendants and sellers, and WSF's public affairs office.

The RCS Best Practices vessel manifesting functions include:

- Add passenger information to the vessel manifest
- Change passenger manifest
- Delete passenger from manifest
- Print manifest

The RCS Best Practices (International Sailings only) maintains passenger manifests to provide adequate identification of boarded passengers. The passenger manifest contents are configurable to meet future security and/or INS requirements. The initial passenger manifest contains (but is not limited to) the following data:

The RCS Best Practices vessel manifesting functions include:

- Passenger name
- Passenger age
- Passenger citizenship
- Driver's license number and issuing state or province
- Passport number and issuing country

### 6.9.2. Staging

The RCS Best Practices Step Two determines staging based on current and historical preferential loading needs, vessel capacity, and vehicle characteristics. Based on these factors, the RCS Best Practices calculates the terminal lane assignment for vehicles and prints the lane number on the receipt.

### 6.9.3. Sailing Statistics

The RCS Best Practices calculates sailing statistics from the manifest for each sailing. The sailing statistics are calculated in real time as vessel manifest change. Sailing statistics are confirmed in real time with redemption confirmation, using passenger face counting and vehicle counting technologies. The sailing statistics define:

- Vessel name and class
- Sailing date and time
- Scheduled date and time
- Route (departure and destination terminals)
- Number of passenger positions not redeemed
- Number of passenger positions unsold
- Number of passengers on board
- Number of vehicles positions not redeemed
- Number of vehicles positions unsold
- Number of vehicles on board

The sailing statistics shall be viewable by vessel personnel, departure and destination Terminal Agents, attendants and sellers, and WSF's public affairs office. The information will also be displayed on the sailing information billboard.

Sailing statistics maintain a history of all prior sailings for analysis. The RCS Best Practice alternative interfaces with WSF's Global Positioning System to determine the exact vessel arrival and departure times.

#### Sailing Statistics Functions

- Display sailing statistics
  - This function displays the sailing statistics for a given sailing.
- Update Statistics
  - The function permits manual corrections to sailing statistics.
- Set sailing time
  - The function uses WSF global position system to automatically determine and set the sailing arrival and departure times.

- Override sailing time
  - This function enables the override of the automatically determined sailing departure and arrival times, or, manually set the sailing time in the event the GPS equipment is down.
- Display sailing space
  - The function displays the available passenger and vehicle space on a given sailing.

## 6.10. Reporting

The RCS Best Practices provides predefined, custom, and ad-hoc reporting capabilities, using standard reporting products.

### 6.10.1. Management Reporting

Management reporting functions for the RCS Best Practices are essentially the same as for RCS Enhance system.

### 6.10.2. Data Warehousing

The RCS Best Practices data warehouse maintains complete sales history for direct, ancillary, third party sales, Web and self-service sales. The data warehouse also contains history of redemption, redemption confirmation, sailing statistics and vessel manifests.

## 6.11. Technical

### 6.11.1. Information Tracking

The RCS Best Practice assigns unique identification numbers to all transactions, transaction line items, and system and domain (lookup) information. This function permits all RCS Best Practices information to be uniquely identified, tracked, and viewed over time.

### 6.11.2. Change Tracking

The RCS Best Practices tracks all changes to information in its audit log; tracked changes include:

- A field added, changed, or deleted
- The old values of changed or deleted information
- The identity and role of the user initiating the addition, change or deletion

- The date and time of the addition, change or deletion

The RCS Best Practices provides controls to configure the duration the audit log is retained and to purge information that is no longer needed.

## 7. ALTERNATIVE DESIGN 4 – AUTOMATE

The fourth alternative design for the RCS is best described as a long-term vision for WSF Revenue Collection. This vision incorporates the features and functions of the RCS Best Practices, while extending the concepts of automation wherever feasible and financially viable. RCS Automate represents the Sierra Systems Project Team's recommendations for automating processes once the Best Practices have been implemented. This system involves the execution of the following actions:

- Replacement of POS and further elimination of functionality
- Implementation of significant changes to existing business processes
- Resolution of remaining weaknesses in systems and controls, and improvements in data reliability

The RCS Automate alternative functionality is derived from the RCS Best Practices. Sales are directed away from the tollbooth as much as possible using the Web and self-service Kiosks

Adoption of the RCS Best Practices will address many of the sales, data integrity, and control issues. However, unlike the other alternatives, automating the tollbooth requires consideration of several additional elements:

- Redesign of terminal facilities
- Redesign of terminal operations
- Marketing of a new customer experience

The RCS Automate alternative will implement the following functions:

- Automate passenger fare determination and monitoring equipment
- Direct sales of single fare passages only
- Cash, credit card and debit card payments only
- Web sales and Self-service Kiosks sell single-fare passage and reservations only
- Self-service Kiosks replace some tollbooths at terminals
- RFCS Smart Card and TNB Transponder completely replaces WSF passes, tickets and all other media
- Fully automated Smart Card redemption
- Accurate, reliable redemption, confirmation providing accurate sailing statistics
- Fully automated reconciliation and balancing

**Due to the extent of changes resulting from automating the sales transactions, and the impact of these changes on WSF's organization and its customers, the Sierra Systems Project Team recommends against the RCS Automate for RCS Phase II.**

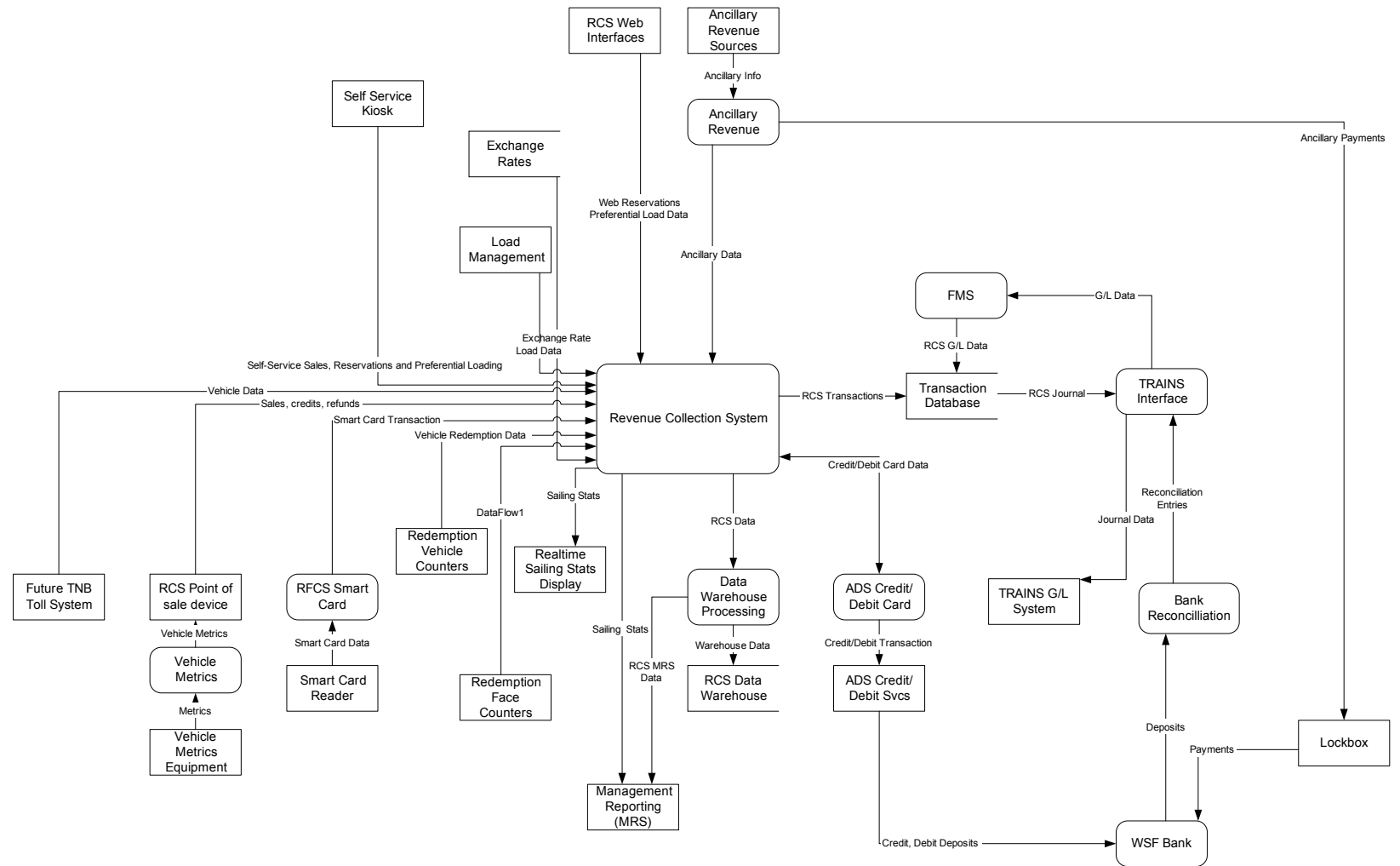


Figure 12: RCS Automate Data Flow Diagram

The RCS Automate provides the following services, or integrates with the external systems outlined below:

Reservations	RCS Automate replaces the existing WSF Space Reservations system with new online reservations and preferential loading functionality. Web reservations are fully integrated with sales, redemption, and vessel manifesting and reporting.
Web Pass Sales	RCS Automate replaces the existing Web sales system with new online sales system of single fares only. Web sales are fully integrated with redemption, vessel manifesting, sailing statistics and reporting.
Credit Card Processing	RCS Automate extends credit card processing to include debit cards. Reconciliation and reporting are fully integrated.
WSDOT TRAINS G/L	RCS Automate is fully integrated with the existing WSDOT accounting system, TRAINS, using third-party integration brokers to manage posting of G/L transactions.
Commercial Charge Accounts	RCS Automate eliminates commercial charge accounts.
Ancillary Revenue	RCS Automate tracks and manages revenue from ancillary activities such as HAZMAT sailings and vessel charters.
Reconciliation	RCS Automate provides fully automated reconciliation of sales, redemption and confirmation of redemption, bank deposits and credit and debit card transactions.
Electronic Funds Transfers	RCS Automate eliminates electronic funds transfer, as personal checks are no longer accepted.
Media Inventory	RCS Automate eliminates media inventory.
Negative Checks	RCS Automate eliminates negative checks, as personal checks are no longer accepted.
Exchange Rates	RCS Automate implements setting of foreign currency exchange rates from electronic sources.
RFCS Smart Cards	RCS Automate fully integrates with the RFCS Smart Card system. RFCS replaces WSF passes.
Self-Service	RCS Automate implements self-service sales of fares only using self-service kiosks and Web-based sales. Self-service replace some tollbooths at selected terminals.
Direct Sales	RCS Automate provides an online point-of-sale mechanism to support fare determination and sales at ferry terminals. The point-of-sale device automatically determines vehicle characteristics such as height and length for automatic determination of over height or over length surcharges.
Vessel Manifesting	RCS Automate automatically tracks passenger information for automatic generation of vessel manifests. RCS Automate alternative automatically determines the number of passenger and vehicle positions boarded using passenger and vehicle counting technology.
Future Sales and Redemption	RCS Automate provides interfaces for future sales and redemption technology such as the Tacoma Narrow Bridge toll system.



## 7.1. Sales

The RCS Automate direct sales at terminals consists of three high-level functions:

- Selling of fares only (RFCS Smart Card replaces WSF passes)
- Automated redemption of fares and reservations
- Processing of refunds for cancelled sailings at the time of the cancellation

The RCS Automate encourages self-service. Self-service kiosks placed near terminals will enable the passengers to purchase single fares. Self-service kiosks may replace some tollbooths at selected high-volume terminals. Web based sales of single-fares extend self-service capabilities of the RCS Best Practices and move sales away from the terminal.

Passengers requiring assistance may purchase fares at the tollbooth. Direct sales are initiated using the RCS Automate alternatives point-of-sale device. Sales will be automatically redeemed.

- At the tollbooth
- Using RFCS Smart Card redemption devices at fully automated turnstiles

Redemption is automatically confirmed using technology such as:

- Automated vehicle counters
- Automated passenger face counters

Automated confirmation of redemption will provide accurate sailing statistics. Accurate counts of passengers and vehicles aboard, or boarding the sailing, enable real-time display of sailing statistics, and real-time confirmation of sales. Providing passengers with accurate sailing information will enable them to know whether or not they can board a given sailing upon arrival at the terminal. WSF's Internal Control and the Washington State Auditor will be able to track sales to bank deposits, confirm sales to passenger and vehicle loading, and compare bank deposits to expect revenues based on confirmed redemption.

The RCS Automate sales processes implements the Sierra Systems Project Team's recommendations by

- Eliminating checks as a form of payment
- Eliminating pre-printed media
- Eliminating commercial charge accounts
- Eliminating passes in favor of RFCS Smart Cards

### 7.1.1. Direct Sales

#### Direct Sales Equipment

Direct Sales equipment is identical to that described for the RCS Best Practices.

***Toll Booth Point-of-sale Equipment***

Tollbooths will feature full self-service point of sales devices for sale of all fares to all customers.

***Handheld Point-of-sale Equipment***

Terminal ticket-takers, attendants, and sellers will use a standard, wireless, point-of-sale, handheld device to sell, void, refund fares, and process RFCS Smart Card redemption. Handheld equipment is the same as that specified for the RCS Best Practices.

***Vehicle Metrics Equipment***

The vehicle characteristics device will measure physical characteristics of a vehicle at the tollbooth, including the vehicle height, width, length and weight.

***Sailing Information Billboard***

The sailing information billboard is a large electronic display device. The sailing information billboard will be confirmed and validated in real-time using RCS Automated real-time confirmation of redemption (see below). The content of the display will be programmable and customized to display information specific to each terminal.

***Vehicle Counting Equipment***

This device will count vehicles at the latest possible point during the boarding process. Vehicle counts will be used to confirm vehicle redemption information and to improve the internal controls, audit, and vessel manifest/sailing statistics.

***Face Counting Equipment***

The face counting device will count the number of passengers boarding at the latest possible point during the boarding process. The obtained numbers will be used to confirm passenger redemption information and to improve the internal controls, audit, and vessel manifest/sailing statistics.

***Automated Turnstiles***

The automated turnstiles will control passenger access to boarding areas. The RFCS Smart Card readers will manage turnstile response: validated cards will be redeemed and access will be granted for a single passenger. Invalid cards, or cards with insufficient fare will be denied and passenger access will not be permitted.

***Direct Sales Functions***

The RCS Automate alternative extends the RCS Best Practices sales functions.

### **Availability and Boarding**

- Enforced sailing cutoff (same as the RCS Best Practices)
- Display space available (same as the RCS Best Practices)
- Collect passenger information (same as the RCS Best Practices)
- Automated staging and lane assignments (same as the RCS Best Practices)

### **Accept Payment**

RCS Automate alternative accepts payment using

- Credit card payment
- Debit card payment
- Cash in United States and Canadian currency (calculating the exchange rates as required and correctly determining the change in USD)
- RFCS Smart Card
- Future payment systems—RCS Automated alternative provides interfaces for automated processing of fares using future systems such as the Tacoma Narrows Bridge system

#### **7.1.2. Self-Service**

The RCS Automate supports and promotes self-service sales transactions from a customer self-service kiosk. The kiosk offers an intuitive, easy-to-use interface for entering transactions. The kiosk also accepts cash, credit card and debit card payments, as well as Smart Card redemptions.

### **Self-Service Functions**

The RCS Automate implements the following self-service functions:

- Make a reservation on a scheduled sailing on a given route
- Fare determination

Determine the fare based on number and type of passengers (adults, children, seniors, etc) and vehicle characteristics.

- Sell Single-Use fares
- Sell single-use tickets
- Revalue Smart Cards

#### **7.1.3. Process payments**

The RCS Automate accepts the following payment options:

- Credit card payment
- Debit card payment
- Smart Card payment

The RCS Automate finalizes self-service transactions by

- Printing a sales receipt including sailing information, lane assignment and fare information
- Updating sailing statistics.

#### **7.1.4. Web Sales**

The RCS Automate replaces the existing Web sales system and implements Web-based sales of passes and single fares. Web Sales processing is the same as for the RCS Best Practices.

#### **7.1.5. Refunds**

Refund processing in the RCS Automate is the same as for the RCS Best Practices.

#### **7.1.6. Third Party Sales**

Third-party sales for the RCS Automate are the same as for the RCS Best Practices.

#### **7.1.7. Ancillary Revenue**

Ancillary revenue for the RCS Automate is the same as for the RCS Best Practices.

### **7.2. Revenue Controls**

Like the RCS Best Practices, the RCS Automate extends the revenue controls provided through existing WSF point-of-sales systems. The elimination of passes in favor of RFCS Smart Card further simplifies redemption and confirmation, and it improves the ability of the RCS Automate to confirm passenger sales to redemption to confirmation.

#### **7.2.1. Balancing**

Automated redemption and confirmation of redemption facilitate the RCS Automate balancing.

- Terminal sales to terminal deposits
- Terminal sales to vehicle and passenger redemption
- Vehicle counters and passenger face counters automatically confirm passenger and vehicle counts and are used to balance to sales and redemption
- Vehicle and passenger counts for sailings, from a terminal, for a given day, will predict within a margin of error, the expected bank deposits

Automated redemption and confirmation enable the RCS Automate to augment the sales balancing by focusing end-of-shift balancing on tollbooth, instead of the individual seller. Managing float at a tollbooth will enable WSF to reduce the amount of working funds allocated to each terminal.

### **7.2.2. Head Office Revenue Reconciliation**

The RCS Automate provides improved cash reconciliation by

- Reconciling deposits to sales
- Reconciling sales to redemption
- Confirming redemption using automated counting mechanisms
- Statistically validating deposits to confirmed redemption
- Automatically reconciling cash deposits, credit and debit card settlements and WSDOT bank sweeps with WSF's Bank balance.
- Smart card reconciliation

The RCS Automate enables manual adjustments to deposit and reconciliation information.

### **7.3. NSF**

The RCS Automate does not accept checks for payment and therefore does not require NSF functionality.

### **7.4. Inventory**

The RCS Automate does not process pre-printed media; there is no Inventory management component in this system.

### **7.5. Commercial Charge Accounts**

The RCS Automate does not process commercial charge accounts; there is no commercial account component in this system.

### **7.6. Redemption**

The RCS Automate extends and automates the RCS Best Practices redemption functions.

- Redeem Smart Card transactions at turnstiles – RCS Best Practice accepts prepaid Smart Card transactions.

- Automated vehicle redemption
  - The RCS Automate uses vehicle counters to confirm the number of vehicles boarded.
  - The process counts axes as vehicles board a sailing and are used to confirm the sale of vehicle fares.
- Automated Face counters
  - The RCS Automate confirms the numbers of walk-on passengers using automated passenger face counters.

## 7.7. Reservations

The RCS Automate replaces WSF's Space Reservation system with an integrated Web Reservations system as described for the RCS Best Practices.

### 7.7.1. Reservation Process

The reservation process for the RCS Automate is the same as the RCS Best Practices.

### 7.7.2. Preferential Loading

The preferential loading functionality for RCS Automate is the same as the RCS Best Practices.

## 7.8. Vessel Manifest and Sailing Statistics

### 7.8.1. Vessel Manifest

The vessel manifest functionality for RCS Automate is the same as the RCS Best Practices.

### 7.8.2. Staging

The staging functionality for the RCS Automate is the same as the RCS Best Practices.

### 7.8.3. Sailing Statistics

The sailing statistics functionality for the RCS Automate is the same as the RCS Best Practices.

## 7.9. Reporting

### 7.9.1. Management Reporting

The management reporting functionality for the RCS Automate is the same as the RCS Best Practices. Improved reporting is achieved with load management and redemption automation with data capture in an integrated data warehouse.

### 7.9.2. Data Warehousing

The data warehousing functionality for the RCS Automate is the same as the RCS Best Practices.

## 7.10. Technical

### 7.10.1. Information Tracking

The information tracking for the RCS Automate is the same as the RCS Best Practices.

### 7.10.2. Change Tracking

The change tracking functionality for the RCS Automate is the same as the RCS Best Practices.

## Appendix A. External System Interfaces

### ADS Credit Card

<b>Interface Name</b>	ADS Credit Card
<b>Interface Type</b>	Text File
<b>Description</b>	<p>The ADS credit card settlement interface contains daily, batched credit card transactions for upload and settlement with WSF's credit card processor.</p> <p>The existing POS system creates a file in a mounted share point for each transaction to be validated. The ADS credit card system detects the file, parses its content and creates a response file with the approval or rejection status, and reference numbers.</p> <p>In RCS, it is envisioned that the entire transaction will occur as in inter-process communications using methods exposed on a standard credit card processing component interface, eliminating the need to store transactions in a temporary file.</p>
<b>Owner</b>	Washington State Ferries
<b>Frequency</b>	Near time

### Detailed Transaction Descriptions

#### Authorization Request:

Transaction(1)(D:\SPSLM5\resp0010.dat) at Tue Sep 17 08:12:14 2002

```
/pid=0010 /TSale MID=051<FS>,6021452700,,,,4388XXXXXXXXX2408=
050210115277163,12.45,,,,,,,,,,,,,200,,,,,,,,,E037,,,,,,,,,,,,,
,,,,,,,,,,,,,
```



### Approval

/TSALE /MID=013,4013240407,4888xxxx2970=0411,114.00,377,W031

Response(1) (. \WSF\0007\resp.dat) at Tue Aug 13 17:01:44 2002

,APPROVAL: 052169,REFERENCE: 3394 APPROVAL:  
052169,L0014003394A052169VI

,A,052169,3394,VISA,VISA,0813021701,WSFR130001

### Void

/TVOID /MID=013,4013240407,6011xxxx1588,1205,114.00,377,W031

Response(1) (. \WSF\0022\resp.dat) at Tue Aug 13 17:15:39 2002

REFERENCE: 3390 VOIDED,A,013172,3390,NOVUS CARDS,0813021715,WSFR130001

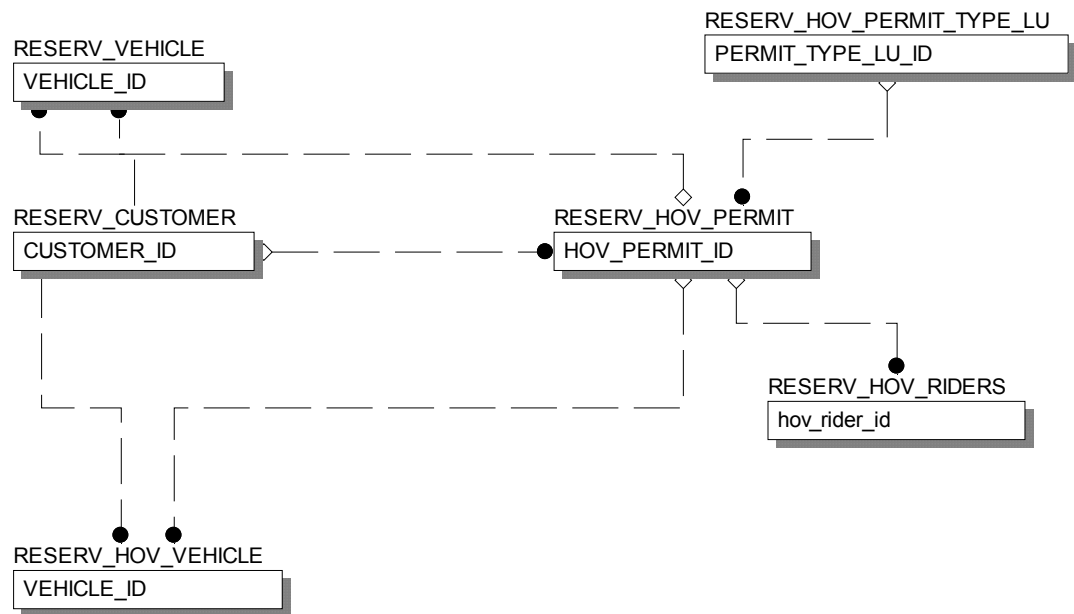
### Sample of a Refund Transaction

/TRETURN /MID=071,3006736655,4426xxxx6500,0903,8.75,428,P043

,ACCEPTED: ,REFERENCE: 0774 ACCEPTED: ,L0035000774A  
VI ,A,0774,VISA,VISA,0909020831,WSFR710001

## WSF Space Reservation Preferential Loading

<b>Interface Name</b>	WSF Space Reservation, Preferential Loading
<b>Interface Type</b>	Database tables
<b>Description</b>	These tables identify customers who receive preferential loading
<b>Owner</b>	Washington State Ferries
<b>Frequency</b>	Real-time

**Figure 13: WSF Space Reservation Preferential Loading**

## WSF Space Reservations

<b>Interface Name</b>	WSF Space Reservation
<b>Interface Type</b>	Database tables
<b>Description</b>	These tables identify customers who receive reduced payment at the tollbooth and guaranteed loading on international sailings.
<b>Owner</b>	Washington State Ferries
<b>Frequency</b>	Real-time

## WSF Space Reservation Vessels

<b>Interface Name</b>	WSF Space Reservation Vessels
<b>Interface Type</b>	Database tables

<b>Description</b>	This table defines vessel-loading characteristics
<b>Owner</b>	Washington State Ferries
<b>Frequency</b>	Real-time

## Check verification services

This is a future interface for verifying checks electronically and in real-time.

## Negative Check File

<b>Interface Name</b>	Negative Check File
<b>Interface Type</b>	Text File
<b>Description</b>	The Negative Check File identifies checking account numbers with outstanding NSF checks, and is used to reject potential NSF checks
<b>Owner</b>	Washington State Department of Transportation
<b>Frequency</b>	Updated daily, checks are validated in real-time

## RFC Smart Card

<b>Interface Name</b>	RFC Smart Card
<b>Interface Type</b>	Component-based, real-time electronic transaction
<b>Purpose</b>	This is future interface for validating, valuing and redeeming Smart Card based payments and transactions
<b>Owner</b>	King County Metro
<b>Frequency</b>	Real-time

## Treasury Management System

<b>Interface Name</b>	Treasury Management System
<b>Interface Type</b>	Text file
<b>Description</b>	This file contains information about banking deposits and sweeps performed by the WSDOT
<b>Owner</b>	State of Washington
<b>Frequency</b>	Daily

## US Bank Transaction Import File

<b>Interface Name</b>	US Bank Import File
<b>Interface Type</b>	Text File
<b>Description</b>	<p>The US Bank Import File is used to reconcile banking deposits and bank account balances with the new Revenue Collection System. The US Bank Import File contains banking transactions formatted in standard BAI Cash Management Balance Report Specifications. See BAI Cash Management Balance Report Specifications Manual, <a href="http://www.bai.org/operations/">http://www.bai.org/operations/</a>.</p>

The US Bank import file is text captured from a US Bank dial-up session. The import file consists of:

- A File Header Record, type 01
- A Group Header Record, type 02
- An Account Record, type 03
- One or more Transaction Detail Records, type 16,
- Each Transaction Detail record may be followed by zero or more Continuation records, type 88

The last transaction detail record is followed by:

- An Account Trailer record, type 49
- A Group Trailer record, type 98

- A File Trailer record, type 99

Each record consists of a set of comma-separated values. The last value is delimited by a slash ('/').

<b>Owner</b>	US Bank, Bank Administration Institute
<b>Source</b>	US Bank, text file captured from a dial-up terminal emulation session
<b>Destination</b>	Revenue Collection System
<b>Frequency</b>	Daily

### File Header Record

The existing revenue control system only uses the record code of the File Header record to detect the beginning of the bank deposit data in the captured data file.

Item	Length	Type	Description	Value
1	2	Numeric	Record code	Constant string '01'
2-9			Not used	

### Group Header Record

The existing revenue control system only uses the record code and the as-of date in the Group Header record.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '02'
2-4		Not used	
5	Numeric	Transaction Date	As-of date for this group of transactions in the form YYMMDD
6-8		Not used	

### Account Header Record

The existing revenue control system validates the account number contained in the Account Header record against the Washington State Ferries bank account number. Transactions not applied to WSF's account are ignored.

Item	Type	Description	Value
1	Numeric	Record code '03'	Constant string '03'
2	Numeric	Account number	Numeric string
3-16		Not used	

### Detail Transaction Record

The revenue collection system validates the BAI transaction code and amount. Customer deposit transactions (BAI code 108) have the ferry terminal ID number encoded in the customer reference field as a nine digit, right justified number with leading zeroes.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '16'
2	Numeric	BAI transaction code	See BAI specifications
3	Numeric	Amount	Dollars and cents without decimals
4-5		Not used	
6	Numeric	Customer reference	Used to encode terminal number
7		Not used	

### Continuation Record

The existing revenue control system ignores continuation records.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '88'
2-n		Not used	

### Account Trailer Record

The revenue collection system discontinues processing detailed transaction records with an account trailer record is processed. No other fields are processed on the account trailer record.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '49'
2-3		Not used	

### Group Trailer Record

The revenue collection system discontinues processing account header, account trailer, detailed transaction and continuation records after processing the Group Trailer record. No other fields are processed on the Group Trailer record.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '98'
2-4		Not used	

### File Trailer Record

The revenue collection system discontinues processing all transaction records after processing a File Trailer record. No other fields are processed.

Item	Type	Description	Value
1	Numeric	Record code	Constant string '99'
2-4		Not used	

## WSDOT TRAINS

<b>Interface Name</b>	WSDOT TRAINS GL
<b>Interface Type</b>	Text File, transmitted via FTP to WSDOT data center in Olympia, Washington
<b>Purpose</b>	The WSDOT TRAINS interface is used to exchange data between WSF's Revenue Control System and the Washington State Department of Transportation General Ledger System.
<b>Description</b>	The Washington State Department of Revenue Transportation Reporting and Accounting Information System (TRAINS) is a modified version of the Government Financial System (GFS) system designed by American Management Systems, Inc. TRAINS provides budgeting, expenditure accounting, accounts payable, accounts receivable, revenue accounting, cost allocation, project billing and work order accounting for the Department of Transportation. TRAINS receive information from RCS.
<b>Owner</b>	Washington State Department of Transportation
<b>Source</b>	GL transactions originate in RCS for upload and processing by TRAINS system
<b>Destination</b>	TRAINS originates account numbers, descriptions and transaction codes for use by RCS
<b>Frequency</b>	Monthly or as needed
<b>Field Description:</b>	The existing WSF revenue management systems report cash transactions using the following records. The records are grouped beginning with a header record and zero or more detail records.



### Header Record

Item	Start	Length	Type	Description	Value
1	1	1	Character	Record Type	Constant 'L'
2	2	15	Blank		Blank (0x20) filled
3	15	4	Character	Transaction Type	Constant 'CR' (Cash Receipt)
4	21	4	Character	Origin Code	Constant '*RG'
5	25	1	Character	Fiscal ID	Constant 'A' for the first year of the biennium, 'B' for the second year
6	26	6	Numeric	Date	In the form YYMMDD
7	32	2	Numeric	Terminal Number	
8	34	2	Numeric	Trailer	Constant '00'
9	36	1	Blank		Blank (0x20) filled
10	37	2	Character	Transaction Code	Constant 'CR' (Cash Receipt)
11	39	3	Character	Agency Code	Constant '*RG'
12	42	1	Character	Fiscal Indicator	Constant 'A' for the first year of the biennium, 'B' for the second year
13	44	6	Numeric	Transaction Date	In the form YYMMDD
14	50	2	Numeric	Terminal Number	
15	52	2	Numeric	Trailer	
16	54	2	Numeric	Record Date-Month	
17	56	2	Numeric	Record Date-Day	
18	58	2	Numeric	Record Date-Year	
19	60	6	Blank		Blank (0x20) filled
20	66	1	Character	Document Action	
21	67	2	Numeric	Bank Account Code	
22	69	16	Blank		Blank (0x20) filled
23	85	14	Numeric	Document Total	Zero filled

**Detail Record**

<b>Item</b>	<b>Start</b>	<b>Length</b>	<b>Type</b>	<b>Description</b>	<b>Value</b>
1	1	1	String	Record Type	Constant 'L'
2	2	15	Blank		Space (0x20) filled
3	15	4	String	Transaction Type	Constant 'CR' (Cash Receipt)
4	21	4	String	Origin Code	Constant '*RG'
5	25	1	String	Fiscal ID	Constant 'A' for the first year of the biennium, 'B' for the second year
6	26	6	Numeric	Date	In the form YYMMDD
7	32	2	Numeric	Terminal Number	
8	34	2	Numeric	Trailer	Constant '00'
9	36	1	Blank		Space (0x20) filled
10	37	16	Blank		Space (0x20) filled
11	53	3	Numeric	Fund Number	Constant '109'
12	56	3	Numeric	Agency Number	Constant '405'
13	59	6	String	WSDOT organization	Constant '365510'
14	65	2	Blank		Space (0x20) filled
15	67	6	Numeric	Revenue Source	
16	73	8	String	Job Number	
17	81	4	Blank		Space (0x20) filled
18	85	4	String	Account	
19	89	17	Blank		Space (0x20) filled
20	106	30	String	Description	
21	136	14	Numeric	Amount	In dollars and cents, decimal omitted
22	150	1	String	Action	
23	151	10	Blank		Space (0x20) filled
24	161	6	String	Control	
25	167	14	Blank		Space (0x20) filled
16	181	2	Numeric	Line Number	Number of this detail item, increasing monotonically from 01

## Appendix B. Users

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### Introduction

To fully understand the purpose of a system, it is essential to know with whom the system will interact. The Revenue Collection System provides functions and services used by Washington State Ferries and Department of Transportation employees (internal users), and by customers of WSF's (external users).

This section describes the characteristics and the needs of each user group.

### Internal Users

#### **WSF Terminal Users**

RCS provides point-of-sale and reporting functions to Terminal Agents, ticket-takers, and sellers.

##### **Attendants**

Attendants are WSF employees assigned to a terminal, reporting to an Agent. Attendants arrange the loading and unloading of vehicles and passengers into and out of the vessel.

##### **Ticket-Takers**

Ticket-takers are WSF employees assigned to a terminal, reporting to an Agent. Ticket-takers accept prepaid fare, and arrange the loading and unloading of vehicles and passengers into and out of the vessel.

##### **Sellers**

Sellers are WSF employees assigned to a terminal, reporting to an Agent. Sellers accept payment and sell various single or prepaid fares for passage, account for inventory and cash float, and deposit cash and negotiable instruments.

##### **Terminal Agent**

Terminal Agents are WSF employees assigned to terminals; they are responsible for money and financial transactions that occur at their terminal, and for keeping their terminal running smoothly and efficiently. Agents make staff assignments, manage coin purchases and cash float, balance and verify reported revenue to bank deposits and other controls.

## **WSF Head Office Users**

### **Accounting Users**

Accounting users create and manage contract accounts, payments and perform reconciliation's.

### **Customer service Agents**

Customer service Agents provide information, make reservations, sell passes and permits to customers by telephone, process mail-order sales of passes and permits, and refund requests by mail.

### **Executives and Managers**

Executives and managers require read-only access to information for analysis and monitoring of the system.

### **Internal Control**

Internal control and auditors require read-only access to system information for audit and control purposes.

### **System Administrators**

System administrators are responsible for the overall operation of RCS. System administrators generally have the greatest levels of access and can authorize new users or change user roles and permissions.

### **HQ – Olympia**

Receives General Ledger/Accounting data from RCS

## **External Users**

### **Ferry Passengers and Customers**

Ferry passengers may be grouped into three distinct classes: transit—knowledgeable users such as commuters; highway—frequent users who use ferries to connect points of the highway system; and tourists—infrequent users.

### **Commuter**

Transit customers use Ferries as public transportation. Transit customers—commuters—are knowledgeable about the operation of the ferry system, the routes, and fares, and rarely need interaction with WSF personnel. A typical transit customer makes frequent trips on a single route.

### **Highway customers**

Highway customers view ferries as an extension of the highway system. These are generally commercial customers transporting goods or providing services and require the ferry system to reach customers. Some highway customers are very knowledgeable about ferry routes and schedules and do not require extensive interaction WSF personnel. Highway customers make one or more trips per week.

### **Infrequent**

Infrequent customers require easy access to assistance. Infrequent customers are generally not familiar with ferry routes, fares or schedules.

## **Contract and Administrative Agents**

### **Contract Agents**

Contract Agents are not WSF employees. Contract Agents sell and collect fares and operate terminals under contract to the Washington State Ferries.

### **Employers Participating in Employer Subsidized Pass (ESP) program**

Employers use RCS Web sales features to purchase passes for their employees.

### **Retailers**

Retailers sell passes. Retailer's user RCS Web functions to order passes, report sales and commissions, and track inventory.

## Appendix C. RCS Impacts

The following table, details the Best Practices (RCS Foundation) impacts. The check mark indicates the alternative(s) each feature is found in:

<b>State Auditor</b>					
No Change	√				
All pre-paid media scanned at time of use, and once scanned cannot be re-used		√	√		
Confirmation of load data creating the ability to match sales/redemption/deposit data to vessel load (Sierra's term for this is 'triangulation')				√	√
Elimination of existing pre-paid inventoried media				√	√
Promotion of electronic payment methods				√	√
Begin separating sales and redemption – example: by moving sales away from toll booths (WEB and Kiosks)				√	√
Reduction of fraud by introducing fully automated sales					√
Reduced cash sales by shifting to electronic payment methods				√	√
<b>Transit Customers – travel frequency measured in trips per week</b>					

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
No Change	√				
Debit Cards accepted		√	√	√	√
Electronic Check replaces paper Checks		√	√		
Prepaid media replaced with Smart Card		i	i	√	√
No staff interaction for walk-on travel at select terminals				√	√
Commercial Charge program eliminated				√	√
Loading cutoff in advance of scheduled departure				√	√
No staff interaction for fare payment at select terminals					√
Payment via Tacoma Narrows Bridge (TNB) transponder		ii	ii	√	√
<b>Transportation customers – travel frequency measured in trips per month</b>					
No Change	√				
Debit Cards accepted		√	√	√	√
Companies and individuals may purchase single fares over the Web		√	√	√	√

Electronic Checks – EFT		√	√		
Travel media replaced with Smart Card		i	i	√	√
Checks not accepted at toll booths				√	√
Commercial Charge program eliminated				√	√
No staff interaction for walk-on travel at select terminals				√	√
Single vehicle/passenger Fares available via Kiosks				√	√
Loading cutoff in advance of scheduled departure				√	√
Payment via TNB transponder		ii	ii	√	√
No staff interaction for travel or purchase at select terminals					√
<b>Tourists – travel frequency measured in trips per year</b>					
No Change	√				
Single fares available on Web		√	√	√	√
Electronic Checks - EFT		√	√		
Reservation information available on RCS		√	√	√	√



Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Reservations available via Kiosks				√	√
Single passenger fares available on Web		√	√	√	√
Loading cutoff in advance of scheduled departure				√	√
Limited person-to-person transaction assistance at select terminals					√
<b>Terminal Agents</b>					
Learn operation of new RCS equipment	√	√	√	√	√
No Change to fare collection rules	√	√			
New desk level procedures dictated by application	√	√	√	√	√
Learn new fare collection Policies and Procedures		√	√	√	√
No paper checks to reconcile			√	√	√
Each seller's working fund issued and retrieved daily			√	√	√
Seller change orders received and recorded in RCS			√	√	√
No Inventory				√	√

No Charges				√	√
Loading cutoff in advance of scheduled departure				√	√
Monitor servicing and maintenance of Kiosks				√	√
Monitor servicing and maintenance of vehicle and face counters				√	√
Off-line procedures: RCS sales and redemption	√	√	√	√	√
Off-line procedures: Vehicle/Face Counters, Kiosks, RFCS and TNB				√	√
Automated traffic management					√
Off line procedures for traffic management					√
<b>Terminal Sellers</b>					
Learn operation of new RCS equipment	√	√	√	√	√
No Change to fare collection rules	√	√			
Tariff modified to facilitate automation			√	√	√
No Change to stock or working fund practices	√	√			
New desk level procedures dictated by application	√	√	√	√	√

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Learn new fare collection Policies and Procedures		√	√	√	√
Scan all prepaid media voiding it		√	√		
Personal checks accepted	√				
Personal checks converted to EFT		√			
Personal checks NOT accepted			√	√	√
Ticket punch replaced with bar code reader		√	√		
Reservation info available on RCS		√	√	√	√
Automated vehicle fare determination at select terminals				√	√
Elimination of permanent working funds – float issued and returned each day			√	√	√
Paper media replaced with Smart Card		i	i	√	√
Payment by TNB transponder		ii	ii		
No Inventory				√	√
No Charges				√	√

Loading cutoff in advance of scheduled departure				√	√
Limited refunds at toll booth				√	√
On-line help		√	√	√	√
E-mail		√	√	√	√
Off-line procedures: RCS sales and redemption	√	√	√	√	√
Off-line procedures: RFCS, Vehicle/Face Counters, Kiosks, and TNB				√	√
Reduced number of staffed toll booths at selected terminals					√
RCS will manage vehicle staging at selected terminals					√
Off line procedures for traffic management at selected terminals					√
<b>Ticket Taker</b>					
Learn operation of new RCS equipment	√	√	√	√	√
Ticket punch replaced with bar code reader		√	√		
Elimination of ticket taker classification at select terminals				√	√
<b>Terminal Attendants</b>					
Learn to enter stats on new RCS device	√	√			

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Get load composition from RCS			√	√	√
Loading cutoff in advance of scheduled departure				√	√
Traffic staging duties limited to when RCS off line					√
<b>Terminal Training</b>					
Train all terminal staff in use of new RCS hardware	√	√	√	√	√
Include Contract Agents in training	√	√	√	√	√
Training in new fare collection Policies and Procedures		√	√	√	√
Train terminal staff in use of email and on-line policies/procedures		√	√	√	√
Training in Smart Card procedures		i	i	√	√
Training in TNB transponder procedures		ii	ii	√	√
On-line traffic management procedures					√
Off line procedures for traffic management					√
<b>Contract Agents</b>					

Contract Agent responsible for revenue losses	√	√	√	√	√
Same as above WSF Terminal Staff by position by alternative	√	√	√	√	√
Use RCS for sales and reporting of revenue	√	√	√	√	√
Elimination of role ticket stock	√	√	√	√	√
<b>Customer Service – Information Agents</b>					
Information Agents learn operation of new RCS equipment	√	√	√	√	√
Info Agents learn new fare collection Policies and Procedures		√	√	√	√
<b>Customer Service - Communicate to Public</b>					
Acceptance of debit card		√	√	√	√
Scanning of prepaid media		√	√		
Acceptance of electronic checks		√	√		
Elimination of passes and coupon books				√	√
Elimination of Charges				√	√
Checks no longer accepted			√	√	√

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Smart Card		i	i	√	√
Kiosk: Sales, Reservations, Permits				√	√
Tacoma Narrows Bridge transponder program		i	i	√	√
Load Cutoff				√	√
Automated redemption at selected terminals				√	√
Automated fare payment toll booths at selected terminals				√	√
Automated terminal staging at selected terminals					√
New refund process – where automation eliminates staff					√
Off-line refund process – where automation eliminates staff					√
<b>Accounting</b>					
No Change	√				
New skill sets required by fully integrated and automated accounting systems – industry standard general ledger accounting practices		√	√	√	√
New automated accounting interfaces to WSDOT systems		√	√	√	√

New AR		√	√		
Reconciliation of RFCS and TNB systems		i & ii	i & ii	√	√
Web sales reconciliation automated		√	√	√	√
Credit/Debit card reconciliation automated		√	√	√	√
Third Party sales reconciliation automated		√	√	√	√
New banking and reconciliation practices			√	√	√
<b>IT – Network Support</b>					
Support network connecting all 20 WSF terminals	√	√	√	√	√
New RCS applications on LAN	√	√	√	√	√
New skill sets required by fully integrated and automated accounting and revenue collection systems			√	√	√
RFCS Smart Card communication network ready		√	√		
RFCS Smart Card communication network implemented				√	√
7 X 24 data center			√	√	√
Maintenance of automated load management equipment					√



Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Tacoma Narrows Bridge toll system technology ready		√	√		
Tacoma Narrows Bridge toll system technology implemented				√	√
<b>IT – Application Support</b>					
Skills to support of new software technologies	√	√	√	√	√
Support Contract Agents	√	√	√	√	√
Maintain revenue application's integration with external modules	√	√			
WSF Space Reservation system replaced by application			√	√	√
New Inventory - ARCS replaced by application		√	√		
Support Third Party sales		√	√	√	√
New skill sets required by fully integrated and automated accounting systems		√	√	√	√
Load and confirmation application support				√	√
Smart Card support		i	I	√	√
Tacoma Narrows Bridge transponder support		ii	Ii	√	√

Off-line procedures: RCS sales	√	√	√	√	√
Off-line procedures: RFCS, Vehicle/Face Counters, and Kiosks				√	√
<b>Administrative Services – Inventory</b>					
New Inventory package		√	√	√	√
All media printed with serial numbers on individual items		√	√	√	√
Elimination of roll tickets	√	√	√	√	√
No inventory of existing types of media				√	√
Inventory of off-line receipts	√	√	√	√	√
Inventory of Smart Cards		i	I	√	√
<b>Internal Control – Operations</b>					
Ability to track individual media		√	√	√	√
Ability to monitor seller sales history directly		√	√	√	√
Automatic notification of variances		√	√	√	√
No roll tickets for contract agents to audit	√	√	√	√	√

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Media scanned and not collected – no more cancelled tickets		√	√		
Elimination of coupon books, and passes				√	√
Off-line procedures: RCS sales	√	√	√	√	√
Off-line procedures: RFCS, Vehicle/Face Counters, and Kiosks		i	i	√	√
Triangulation				√	√
Fare collection and redemption functions segregated at all locations					√
Limited number of staff involved in sales or redemption					√
<b>Planning – Statistics</b>					
Data included from all routes in system	√	√	√	√	√
Statistics based on sales (fare payment)	√				
Statistics based on redemption (surrender of media)		√	√		
Statistics fully automated (no staff entries required)				√	√
Statistics based on number of passengers and vehicles actually boarded (confirmation counts)				√	√

<b>WSF Management</b>					
New Reporting System allowing managers direct access to the sales and use data	√	√	√	√	√
Data based on Sales only	√				
Greater accuracy resulting basing data on redemption		√	√		
Greater accuracy resulting from basing data on actual boarding counts				√	√
<b>Terminal Facility Modifications – Capital Improvements</b>					
Interior Toll Booth modifications	√	√	√	√	√
Network connections must be installed at all control points for connection of bar-code readers		√	√	√	√
Installation of confirmation equipment close to boarding points				√	√
Installation of turnstiles at select location			i	√	√
Installation of sailing information billboards			√	√	√
Installation of automated sales kiosks				√	√
Installation of RFCS readers				√	√

Customer impacts (internal & external) resulting from implementation of RCS alternatives	Alt 1 Replace	Alt 2 Enhance	Alt 3 Best Practices		Alt 4 Automate
			Step 1	Step 2	
Purchase of right-of-way for vehicle access at Mukilteo and Bainbridge to provide room for automatic vehicle metrics equipment				√	√
Installation of vehicle measurement equipment at select terminals to measure: Length, Width, Height, Ground Clearance, Number of vehicles, Weight per Vehicle, Distance between Vehicles				√	√
Increase the number of access lanes, at some locations, to maintain through-put levels when converting to automated fare collection					√
Rebuild terminals for processing pedestrians: controlled passenger areas and/or turnstiles at select locations					√
Additional acquisition of right-of-way to construct vehicle turn out at select locations (similar to Anacortes)					√
Directional signage for management of terminal staging at select locations					√
Terminal holding areas must be expanded to 150% of largest vessel on run wherever reservations/first-come first-serve/priority programs are mixed					√

## Appendix D. Technical Requirements

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This following section offers a high level description of how the technical, non-functional requirements and processes of the Revenue Collection System (RCS) are addressed. It provides an overview of the needs of the RCS, without repeating the specific, detailed requirements documented in the Washington State Ferries Revenue Collection System Requirements. Please refer to that document for specific requirements.

Non-functional requirements address general needs of a system that is confined to a specific feature, behavior, or process implemented by the system. Typical non-functional requirements describe needs for system usability, reliability, performance characteristics, scalability, system maintenance and support, controls and audit trails, backup and recovery. This section addresses how the Conceptual Design addresses these requirements.

### General Requirements

RCS will be designed as an n-tiered application distributing processing across:

- Commercially available point-of-sales devices for tollbooths, sales counters and handheld functions
- Commercially available database servers providing a modern database management system for data storage
- Commercially available Web servers for Internet access to customer functions
- Application servers implementing business logic and enforcing WSF business rules
- Specialty application servers providing credit card, debit card, Smart Card and electronic funds transfer services
- A host-integration broker for integration with existing WSF and WSDOT legacy applications
- A data warehouse system for user defined and ad hoc reporting and queries.

All RCS software will be written in a common and well-known, modern, high-level and highly structured language. Third-party vendors should provide many components to address specific needs and requirements. All RCS components will have version numbers and will be controlled with a configuration management system.

### Usability

Usability refers to the ability of users to complete their tasks. It is the effectiveness, efficiency and satisfaction with which users may achieve their goals. In modern computer systems, usability addresses the aesthetics and consistency of the human interface, the availability of help and guidance and training.

The operation of the Revenue Collection System will be intuitively obvious to its users. Seller and attendant functions will be organized in a way that facilitates their work. Receipt and ticket delivery mechanisms minimize repetitive motion. Point-of-sale device components can be moved and adjusted to handle the changing environment of the tollbooth. Touch sensitive screens and online help will guide the seller and attendant through the systems operations.

The RCS will provide extensive online help for all of its features and operations. Its online help can be readily customized by WSF to address changing functional, operational and policy needs.

## Reliability

The Revenue Collection System will be deployed on redundant servers providing high-availability of 99.99% measured over a twenty-four hour day, 365 days per year duty cycle permitting a maximum of two hours downtime per year. RAID-0+1 storage technology will guard against the failure of any single storage component.

The RCS will implement two-phase commit transactions to ensure the integrity of its data. This will ensure that a transaction is entirely complete or entirely rolled back. Under no circumstance will a transaction be partially processed. Point-of-sales devices will detect and automatically retry transactions rolled back by a component failure. System configuration parameters will enable WSF to control the number of retries and duration transactions are retried.

The system and terminal point-of-sales device will be resilient to network failures and capable of processing transactions offline during a network failure of up to seven days.

## Performance

The RCS performance is instrumental to selling and redeeming terminal sales transactions, and a significant contributor to moving customers quickly through the sales and redemption process. 95% of all RCS transactions must be completed within 0.3 seconds, excluding external processing such as credit card, debit card and EFT validation. No transaction will take longer than two seconds. 95% of all external domestic transactions (credit card authorization) will be completed within three seconds.

## Scalability

The Revenue Collection System's n-tiered architecture will support future growth and processing requirements by scaling-up and scaling-out. The RCS can scale-up by increasing the performance capabilities of application, Web and database servers. The RCS can scale out by adding application, Web and database server—components may be spread across more processors as needs change.

## System Maintenance and Support

The Revenue Collection System will facilitate system maintenance and support. All source code will be fully documented and well commented. The RCS components will provide standard interfaces enabling future growth, support and maintenance.

All custom software will be delivered in source, including all development and support tools, build procedures, and software design and construction documentation.

Seller workstations and point-of-sales devices will be constructed from commercial, off-the-shelf components.

## Controls and Audit Trails

The RCS will provide controls and audit trails in accordance with generally accepted accounting principals (GAAP).

The RCS will track all transactions and changes to transactions. Users with appropriate levels of access, such as system administrators and auditors, may view additions, changes and deletions, the identity and role of the user making the addition, change or deletion, and the date and time of the change.

## Privacy and Security

The Revenue Collection System will contain information confidential to both WSF and its customers. For this reason, the RCS will allow only authorized user access and at the appropriate level. It shall provide features to ensure data confidentiality and track access to data.

### Access

All software, systems, subsystems and devices will allow only authorized user access.

The RCS will implement access control to all features and functions based on user identity, the user's association to groups, and the user's role. Each RCS user will have a unique username and password. The RCS will require strong passwords made up of a combination of eight or more letters, numbers, and special characters. Access to individual RCS functions will be determined by the user's role and work location. The RCS system administrator may change the user's role and access at any time.



The RCS will log all system access. The user's identity, role, date, time and location will be recorded in the log.

The RCS will not print or display passwords, nor will it fully display sensitive information such as credit card numbers.

Credit card, debit card and check numbers will be encrypted between the point-of-sale device and the appropriate service bureau.

### **Confidentiality**

The RCS will protect the confidentiality of customer's information. Confidential information such as credit card numbers, debit card numbers, checking account and routing information, and/or Smart Card identification will be encrypted.

The RCS will ensure data confidentiality including prohibiting unauthorized access to customer's personal information and other confidential data, and the association of user identity to user specific activities.

### **Security**

The RCS will ensure the security of confidential WSF and customer data:

- Wireless and handheld point-of-sale devices shall transmit industry standard 128-bit encryption algorithms.
- The 802.11B wireless access point accepts connections only from approved and configured devices; unapproved wireless devices and personal computers are explicitly excluded from the WAN using MAC address exclusion technology.
- Confidential customer data will be stored in encrypted formats.

## **Data Retention**

The Washington State Ferries complies with data retention and destruction requirements as defined by the Revised Code of Washington (RCW), the Washington Administrative Code (WAC) and Washington State Department of Transportation (WSDOT) directives. Codes and directives applicable to RCS are:

1. RCW 40.14, *Preservation and Destruction of Public Records*
2. RCW 42.17.260, *Documents and Indexes to be Made Public*
3. RCW 42.17.290, *Protection of Public Records - Public Access*
4. WAC 468-06, *Public Access to Information and Records*

5. WAC 434-640-030, *Disposal by Recycling*
6. WSDOT Directive D 72-21, *Release of Public Records*
7. WSDOT Directive D 72-42, *Utilization of the State Records Center*
8. WSDOT Instructional Letter IL 4027.00 *Ethics Compliance*

## Backup and Recovery

The Revenue Collection System will protect critical data and information during normal operations and catastrophic failures. Key features to backup and recovery include:

- High performance backup to magnetic media such as DLT, LTO, S-AIT or SDLT
- RAID-1+0 redundant storage media
- Mirrored system application, web and database servers

The RCS databases and data storage is protected from hardware failure using RAID-1+0 technology. RAID-1+0 is a mirror of striped sets that provides a protection from single points of failure and high performance.

Mirrored sets may be taken broken (that is, one of the mirrored sets taken off line) for real-time backup of critical system data while retaining high availability of the underlying RAID-1 datasets. This mechanism permits complete and reliable backup of system data without the need to take RCS down or even affecting the performance of RCS.

Critical components—database, application and Web servers—will use mirrored systems and use load balancing routers, RAID-1+0 storage technology, mirrored servers and magnetic backup to protect against most routine outages and the failure of a disk or server.

Remote RCS locations—terminals and other non-head office work sites—will be backed up off peak hours using a network backup utility.

## Environment

The RCS back-office components will operate in a high availability data center providing adequate heating, ventilation and air conditioning.

The RCS point-of-sales devices may operate in an industrial/marine environment. Characteristics of this environment include:

- **Exposure to direct sunlight.** Screens and displays must be readable in direct sunlight or be movable or repositioned to avoid direct sunlight.
- **Temperature extremes.** Temperatures range from below freezing to over 110° Fahrenheit with a wide range of humidity.
- **Exposure to wind, rain, snow, salt and dust.** Tollbooths and their contents are exposed to the elements through open windows and doors.

All hardware must be protected against dust and splashed water (IEC protection standard 60529 level IP52). All equipment must meet or exceed OSHA standards.

## WSDOT/WSF Desktop Environment Standards

The Washington State Department of Transportation and WSF strive to provide a desktop environment, in which employees have appropriate levels of access to information, can effectively communicate with their peers, and can send and receive information. This environment is known as the WSDOT Level Playing Field and is defined by the WSDOT Level Playing Field for Desktop Applications.

The RCS point-of-sales devices for terminals and handheld devices are not regarded as desktop environments. These devices do not need adhere to the WSDOT/WSF desktop environment standards.

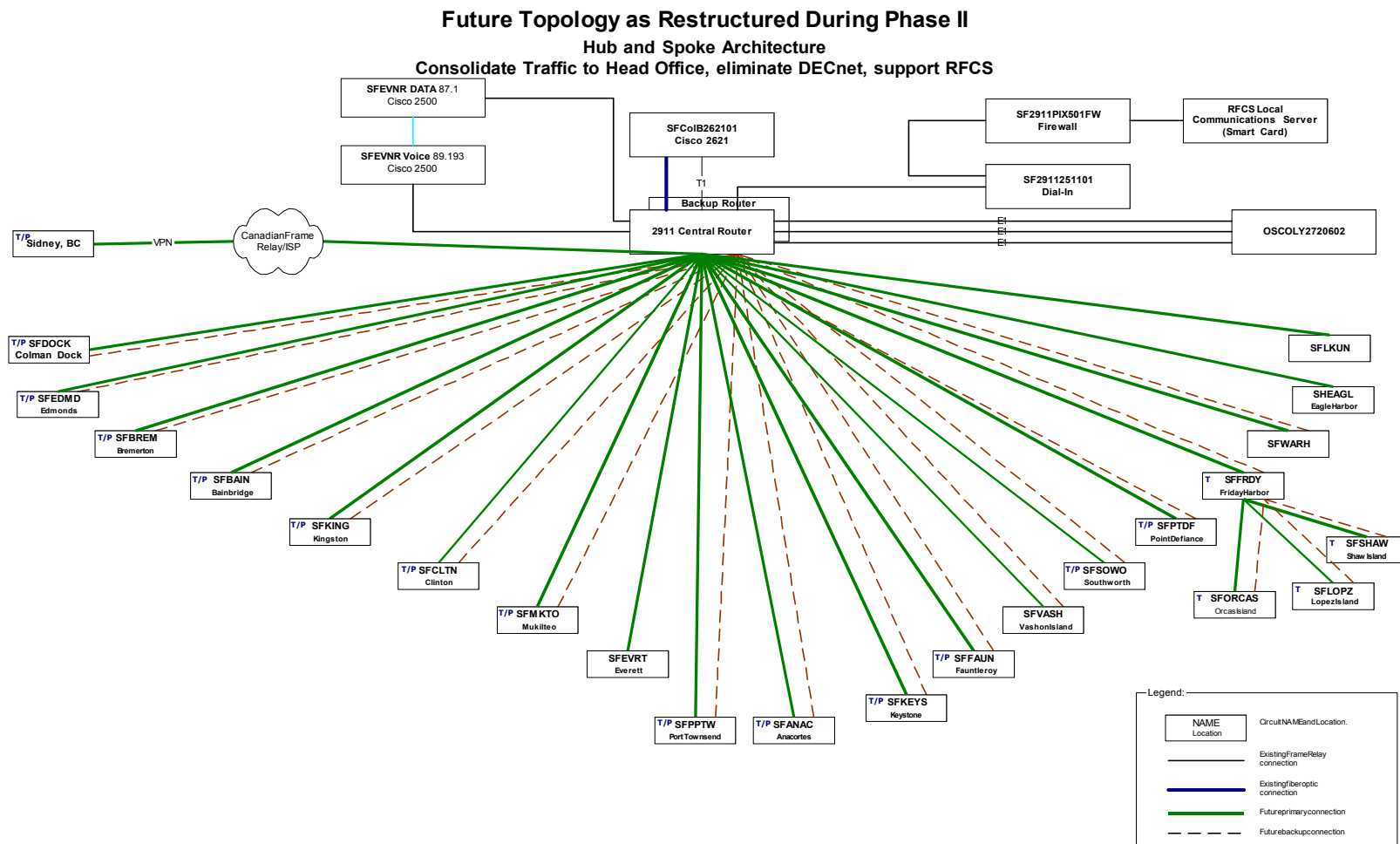
## SYSTEM ENVIRONMENT

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This section describes the hardware and software environment in which the Revenue Collection System will be deployed.

### Network Architecture

Figure 14 illustrates the proposed topology for WSF's network to support RCS.

Figure 14: RCS Network Topology<sup>8</sup>

The proposed network topology provides a hub and spoke architecture with network services centralized at the RCS data center. While WSF has options for the placement of the data center—as discussed in the Report to Washington State Ferries Revenue Collection System Future System Topology—this diagram assumes the RCS data center will be placed at WSF’s Head Office.

The proposed hub-and-spoke topology minimizes hops between nodes, provides redundant network connections for improved reliability and simplifies future network maintenance.

## Deployment Architecture

The Revenue Collection System distributes sales, redemption, account and reporting functions across multiple locations and system devices, each connected to the Washington State Ferries wide-area network.

Each component in the RCS implements elements of fault tolerance and high availability. The point-of-sale device is capable of recording sales and redemptions when disconnected from the WAN due to network difficulties. The RCS back-office servers distribute business logic components across multiple servers. Each server is capable of detecting and backing up the others. The RCS data is stored on high available redundant arrays of independent disks (RAID) to guard against the failure of any disk or controller component.

The following sections describe the deployment of RCS components on RCS system devices.

## WSF Revenue Collection System Point-of-sale Devices

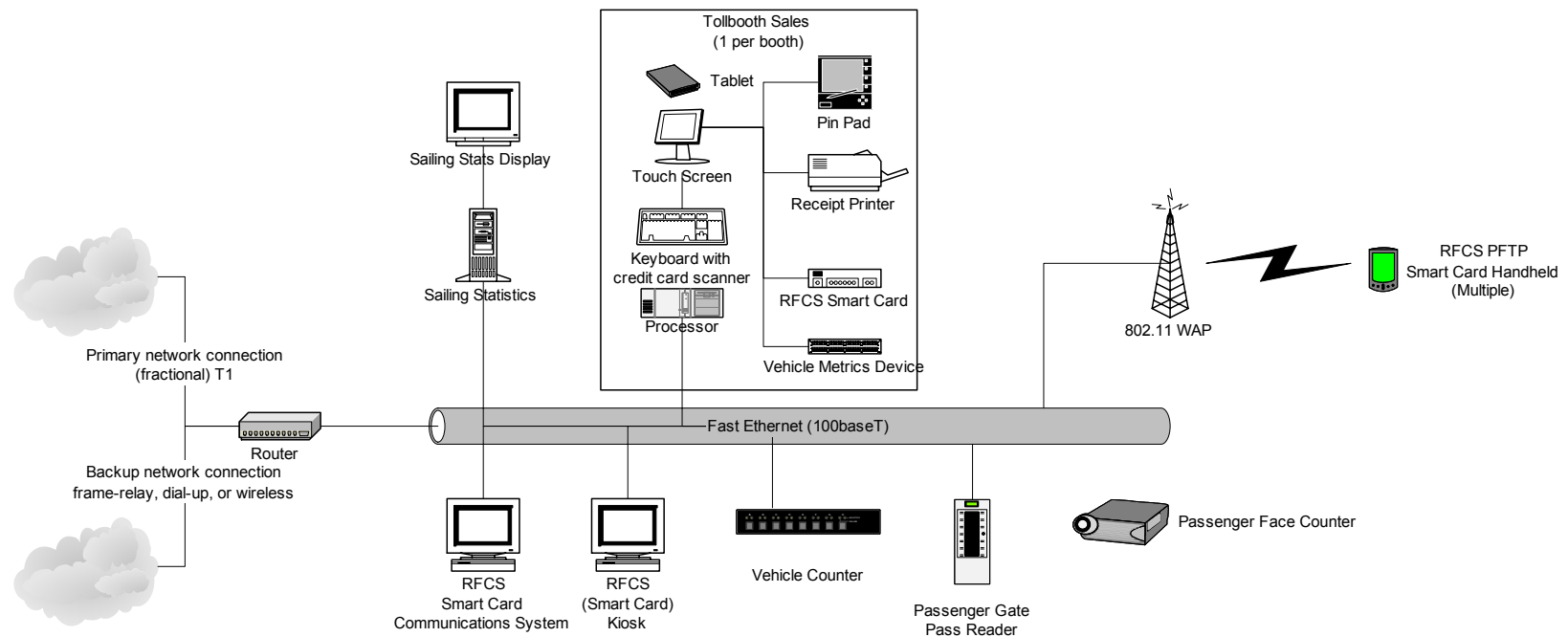


Figure 15: Typical Terminal Network

The Revenue Collection System point-of-sale device connects to the RCS servers through the Washington State Ferries wide-area network. Each terminal and point-of-sale device location provides a 100baseT Fast Ethernet hub for the point-of-sale device, WSF 802.11A/B wireless access points, Regional Fare Collection Smart Card system devices and other WSF computer systems.

The tollbooth point-of-sale device connects the point-of-sale computer, display, printer, and input devices to WSF's wide-area network.

Handheld point-of-sale devices connect through an 802.11B wireless access point. Handheld information is transmitted encrypted using an industry standard 128-bit encryption algorithm. The 802.11B wireless access point accepts connections only from approved and configured devices; unapproved wireless devices and personal computers are explicitly excluded from the WAN using MAC address exclusion technology.

### WSF Revenue Collection System Servers

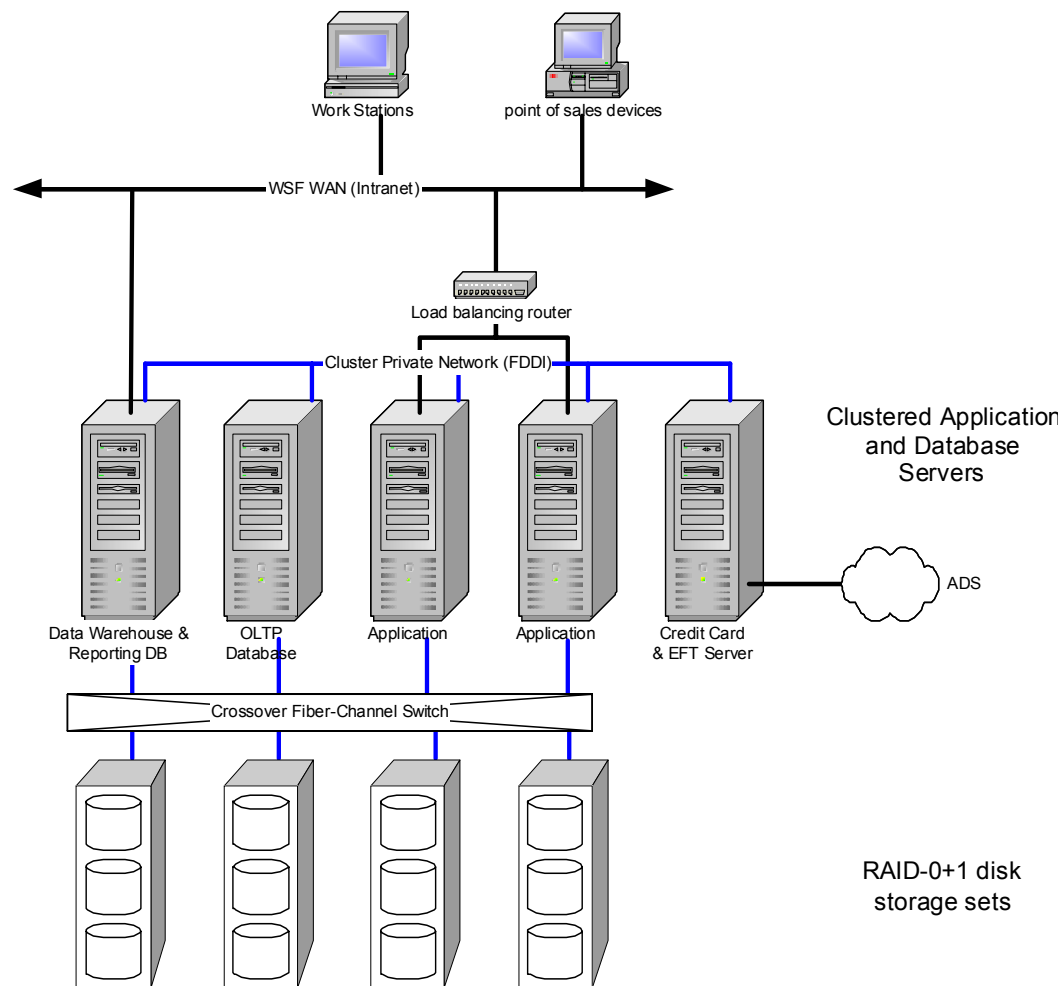


Figure 16: Server Deployment Diagram

The Revenue Collection System distributes server functions—point-of-sale transaction collection, accounts receivable, inventory, reporting and data warehousing—across multiple servers: application servers for processing business logic, a database server for managing accounting data and processing sales transactions, and a data warehouse and reporting server for processing queries and *ad hoc* reports. Data is stored on redundant arrays of independent disk (RAID) farms cross connected to each server to provide multiple access paths for redundancy, fail-over and back-up capabilities.

Application logic (business rules and business processing) is implemented using stateless components across one or more application logic servers. Access to application servers is controlled through a load-balancing router. This architecture permits requests for information and sales transaction load to be balanced across one or more application servers, and provides support for future scale-out growth: as transaction volumes and loads increase, performance is kept constant by adding more application servers. The application servers may be clustered to support automatic fail-over in the event of a failure of a system component.

## Database Architecture

The database server manages data; this server implements storage rules for business data, processing validation inquiries and processing online sales transactions. The database server is connected to the application servers and data warehouse and reporting server using a private fiber-optic network. This network provides both, high performance application component access to data and significantly improves data security by isolating access to data to application components. The database is not visible to WSF's intranet, extranet or Internet except through carefully controlled business logic components.

All routine reporting, invoicing and other batched data access is provided through the data warehouse and reporting server. This server contains a snapshot of the online database taken as needed to produce reports, invoices, and support *ad hoc* queries. Isolating reporting from online transaction processing helps ensure good response for point-of-sale transactions and allows the reporting database be tuned for optimal query and reporting performance. This server also supports WSF's data warehouse database and tools.

The Revenue Collection System database and other storage needs are addressed using a RAID-0+1 storage farm. RAID-1+0, sometimes known as RAID-10, is a mirror (RAID-1) of striped disks (RAID-0). RAID-0, also called disk striping, divides data into blocks of information. These blocks are spread in a fixed order across all the disks in an array. RAID-0 improves disk access performance by spreading read and writes operations across multiple disks. RAID-1, also known as disk mirroring, provides a redundant, identical copy of a selected disk. RAID-1+0 combines these technologies by creating a mirror of striped disks. RAID-1+0 provides the performance benefits of disk striping with the redundancy of mirroring. Using RAID-1+0 provides the highest read/write performance available.



## System Software

The Revenue Collection System is implemented using standard, off-the-shelf system software.

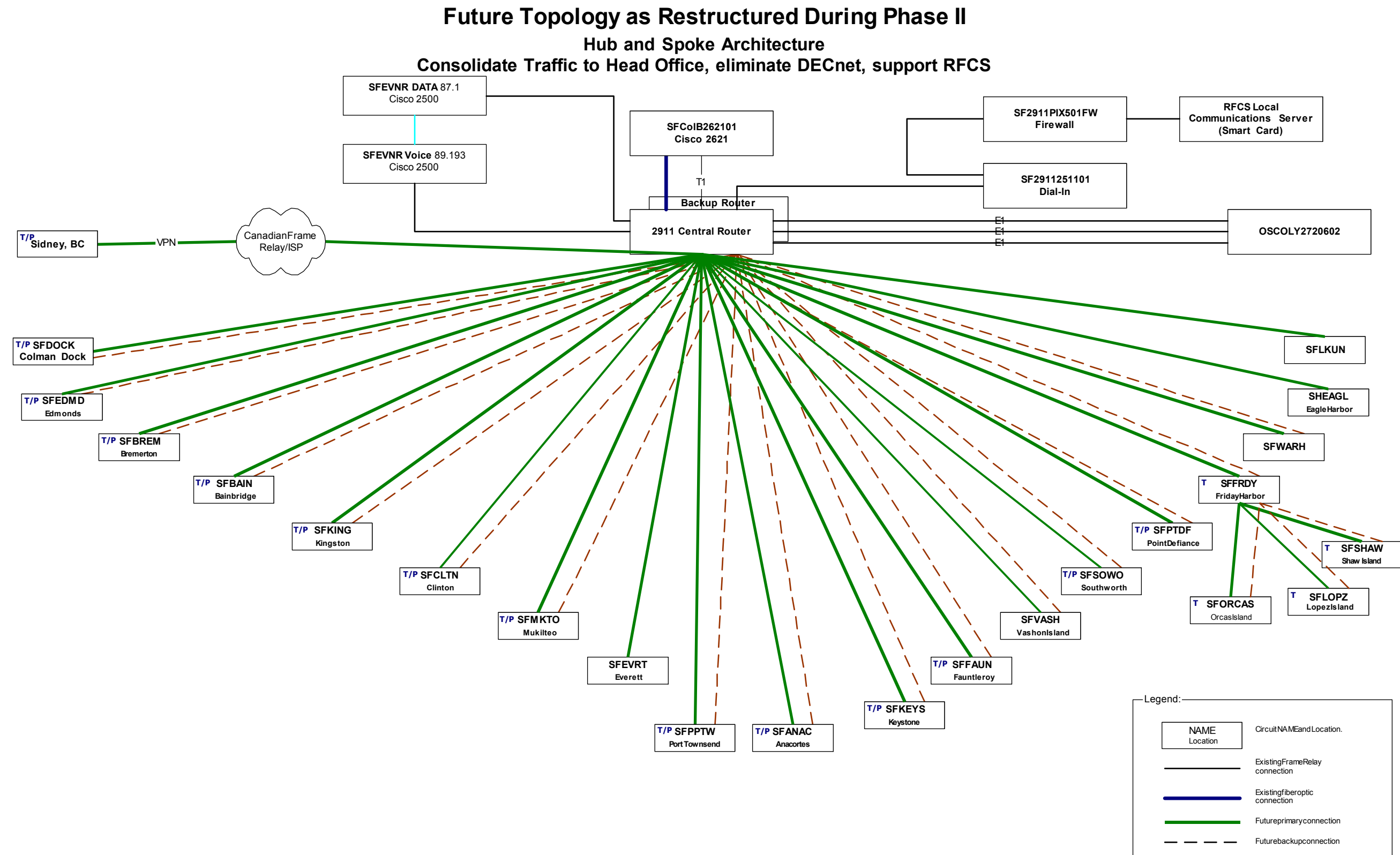


Figure 17: Future Network Topology

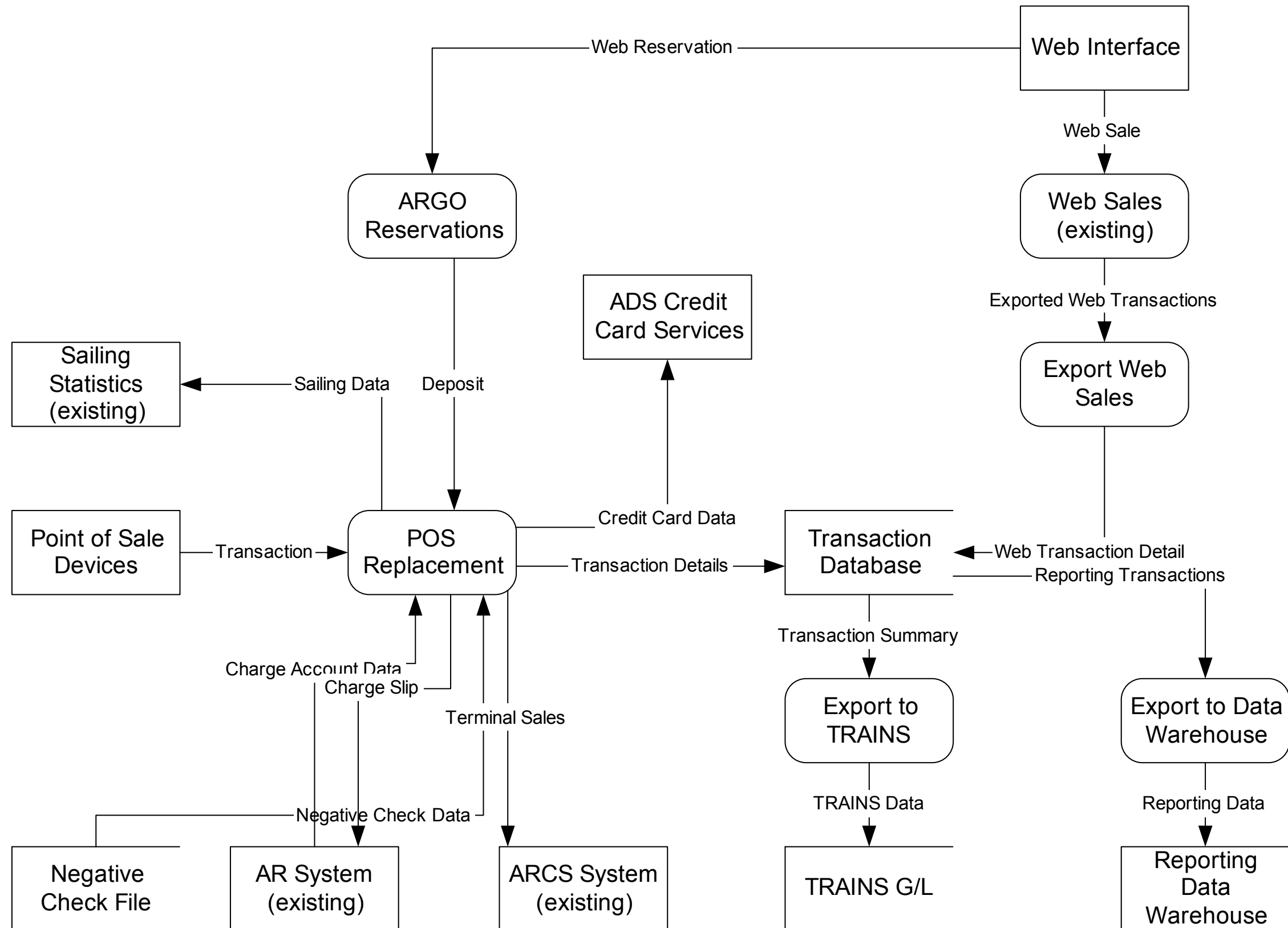
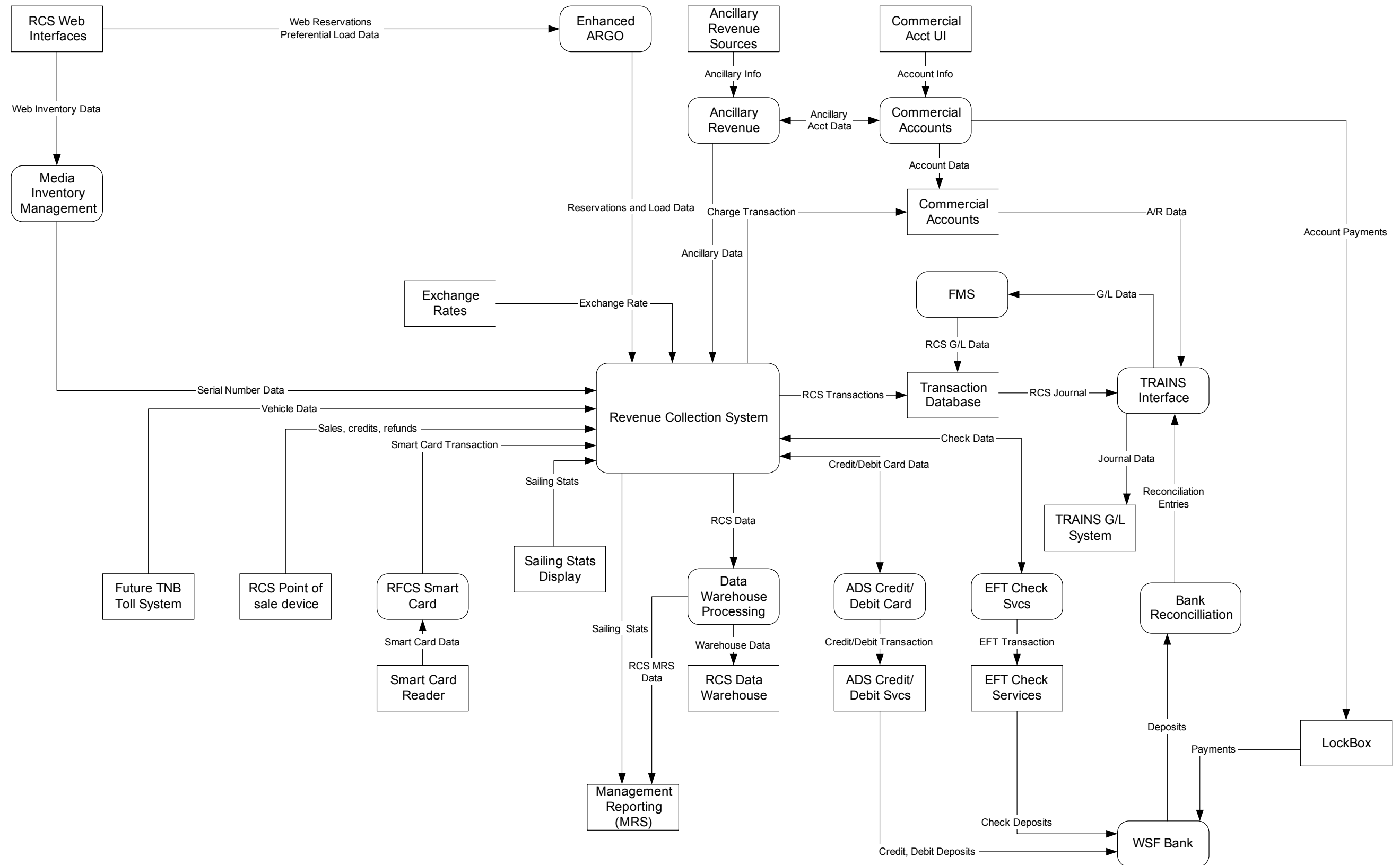


Figure 18: RCS Replace Data Flow Diagram



**Figure 19: RCS Enhance Data Flow Diagram**

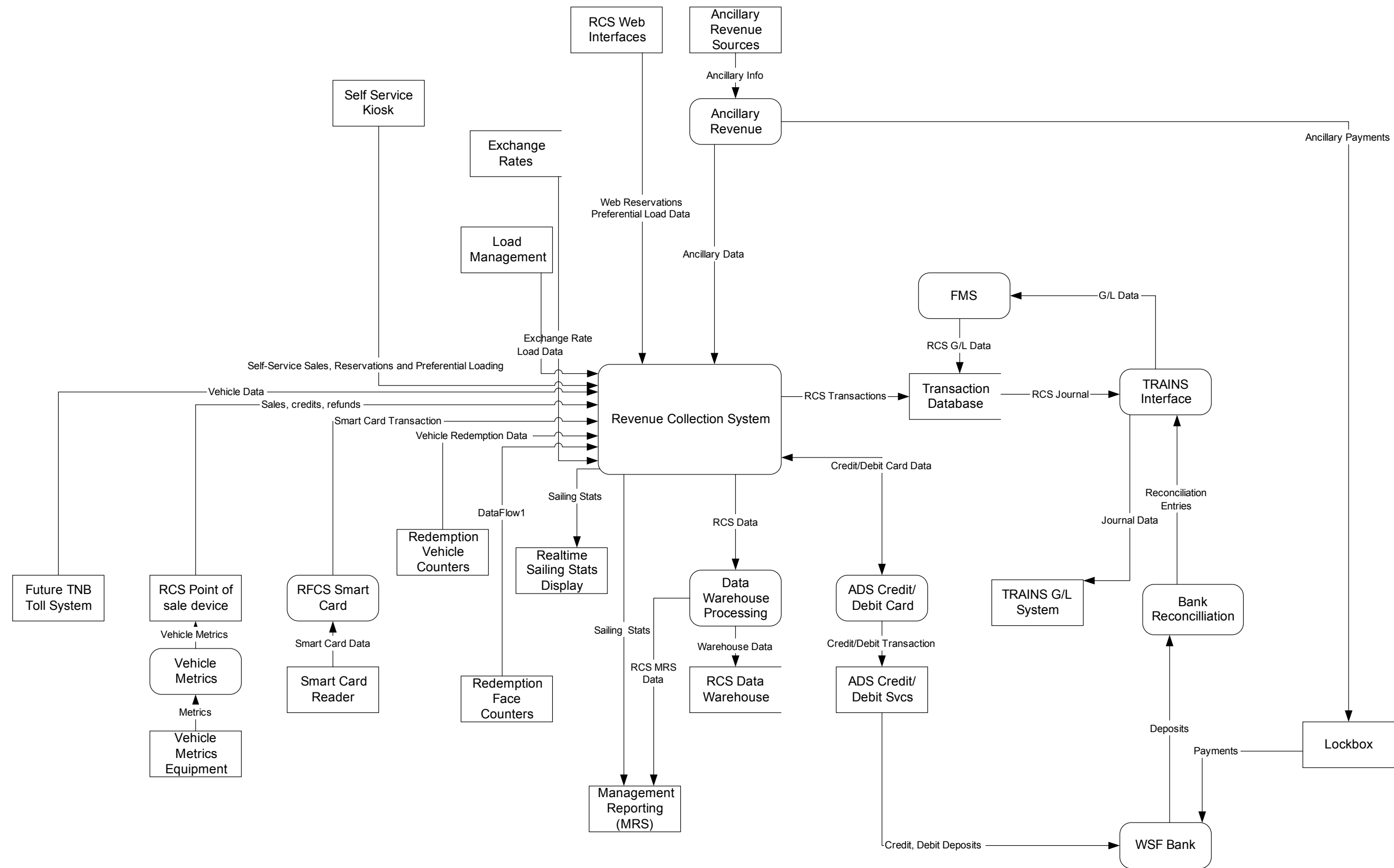


Figure 20: RCS Best Practices/RCS Automate Data Flow Diagram

Washington State Ferries  
Revenue Collection System  
Logical Data Model

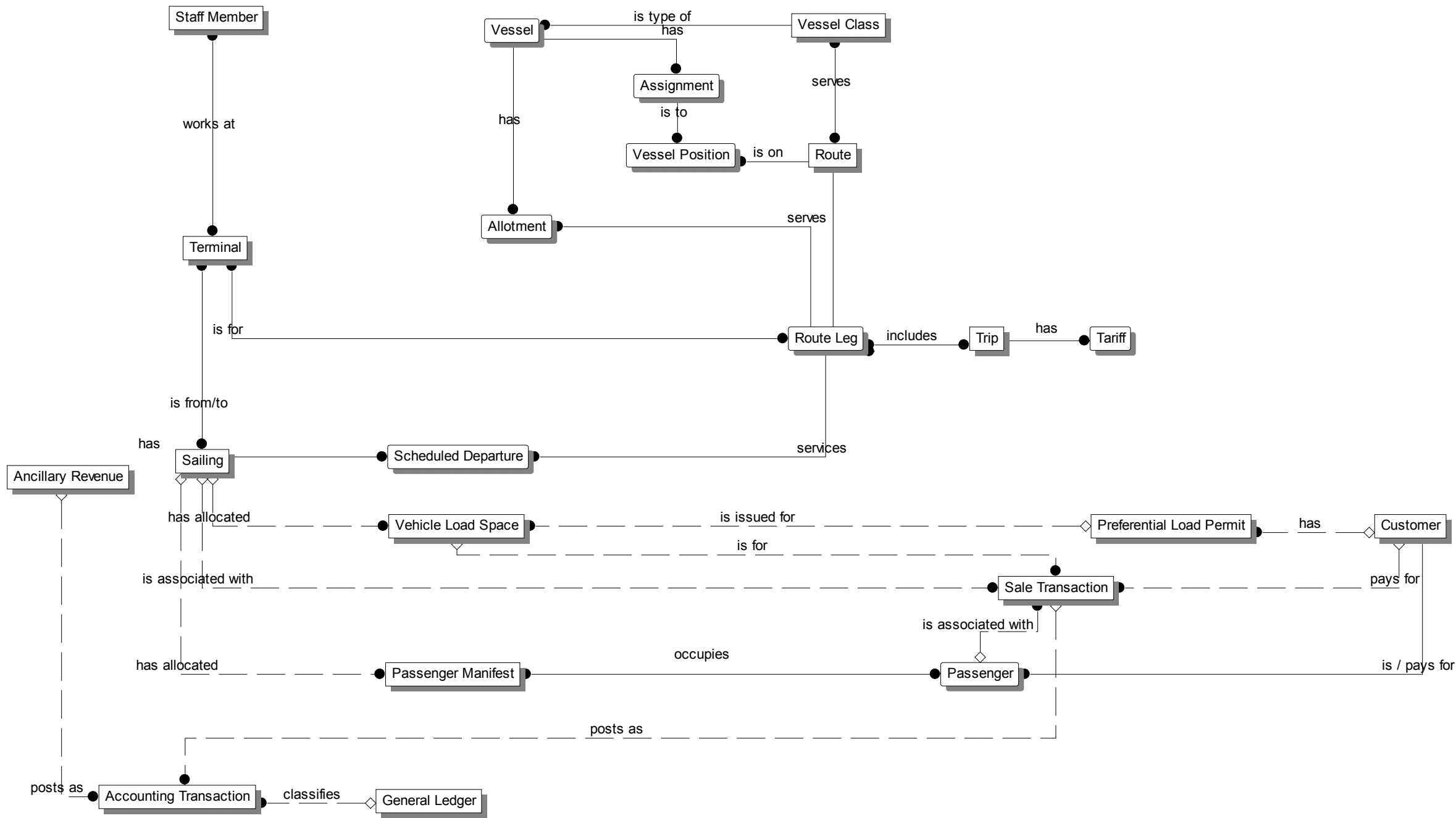


Figure 21: RCS Logical Data Model

## Appendix E. Definitions, Acronyms, and Abbreviations

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The following glossary contains terms, acronyms and abbreviations needed to interpret properly this Conceptual Design Document.

<b>ADS</b>	Alliance Data Systems WSF's Credit card processor
<b>AIT</b>	Advanced Intelligent Tape. A tape backup technology.
<b>ARCS:</b>	Automated Revenue Control System, a legacy system used by the Washington State Ferries to manage ticket inventory and revenue collected by the existing POS system.
<b>BAI:</b>	Bank Administration Institute, a leading professional organization devoted exclusively to improving the performance of financial services companies
<b>CAD:</b>	International monetary symbol for Canadian Dollars
<b>Confirmation:</b>	The third component of the transaction where loading data is captured and reported. This data is used to verify the other two components of the transaction (Sales and Redemption). The three components of the transaction are Sales, Redemption and Confirmation.
<b>COTS:</b>	Commercial, off-the-shelf. Referring to commercially available software or hardware components.
<b>DEC:</b>	Compaq Computer Corporation purchased The Digital Equipment Corporation
<b>DECnet:</b>	An OSI compliant networking technology created by Digital Equipment Corporation and maintained by its successor, Hewlett-Packard Company (formerly Compaq Computer Corporation)
<b>DLT:</b>	Digital Linear Tape. A type of 1/2" wide magnetic tape used for backup
<b>EFT:</b>	Electronic Funds Transfer
<b>FTP:</b>	File Transport Protocol, a standard for exchanging files and data over computer networks
<b>GPS</b>	Global Positioning System
<b>G/L:</b>	General Ledger

<b>Head Office:</b>	WSF head office at 2911 2 <sup>nd</sup> Avenue, Seattle, Washington
<b>High Availability:</b>	The percentage of time that a system is available to its users. Typical high availability percentages from 99% to 99.9% up time, or downtime of 8.76 hours per year
<b>Kiosk:</b>	An automated device for self-service sales, reservations and HOV permits. Kiosks may be located at a WSF facility, on board a vessel or off-site.
<b>LAN:</b>	Local Area Network
<b>Lockbox:</b>	Payment collection point provided by WSF bank
<b>LTO</b>	Linear Tape-Open Technology. A tape backup technology.
<b>MAC Address:</b>	Media Access Control Address, a unique number assigned to a computer network device
<b>Media:</b>	Type of ticket, coupon or pass used for prepaid fare
<b>MICR:</b>	Magnetic Ink Character Recognition, a character recognition system that uses special inks and characters, found on checks.
<b>NSF</b>	Non Sufficient Funds
<b>N-Tier:</b>	A computer application that is distributed across three or more servers or processing nodes
<b>Point-of-sale device:</b>	A device used to conduct sales transaction
<b>POS:</b>	Point of Sale, an existing distributed point-of-sale application
<b>RAID:</b>	Redundant Array of Inexpensive Disks. A group of disk drives over which data is distributed. The disk drives are used together to facilitate faster Storage and Retrieval and greater data security than would be possible with a single disk drive.
<b>RCS:</b>	Revenue Collection System
<b>Redemption:</b>	The second component of the transaction where the product is validated and accepted (redeemed) in exchange for ferry services. The customer



may display a document for review, submit media for scanning (i.e. on a pass or ticket), or physically exchange a coupon, boarding pass or receipt in this process. The three components of the transaction are Sales, Redemption and Confirmation.

<b>RCW:</b>	Revised Code of Washington
<b>RFC:</b>	Regional Fare Coordination
<b>RFCS:</b>	Regional Fare Coordination System
<b>Sales:</b>	The first component of the transaction where a product (i.e. permit, pass, frequent user ticket book, single fare) is sold to the customer in exchange for payment. The three components of the transaction are Sales, Redemption and Confirmation.
<b>SDLT:</b>	Super Digital Linear Tape. A type of 1/2" wide magnetic tape used for backup
<b>Smart Card:</b>	A card about the size of a credit card containing a microchip that can be loaded with data
<b>Terminal:</b>	As used within this document, a terminal refers to a ferry terminal, any facility for docking vessels, loading or unloading passengers or maintaining vessels
<b>TMS:</b>	Treasury Management System
<b>TNB:</b>	Tacoma Narrows Bridge
<b>TRAINS:</b>	Transportation Reporting and Accounting Information System (mainframe)
<b>Transaction:</b>	An activity with three sequential components: Sales, Redemption and Confirmation.
<b>Triangulate:</b>	The comparison of three values to estimate or test the reasonableness of a fourth value. The three components of the transaction Sales, Redemption and Confirmation can be used to triangulate the amount of the bank deposit.
<b>USB</b>	Universal Serial Bus
<b>USD</b>	International monetary symbol for United States Dollars

<b>VPN:</b>	Virtual Private Network
<b>WAC:</b>	Washington Administrative Code
<b>WAN:</b>	Wide Area Network
<b>WSDOT:</b>	Washington State Department of Transportation
<b>WSF:</b>	Washington State Ferries
<b>XML</b>	Extensible Markup Language

## Appendix F. References

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## Appendix G. WSDOT Desktop Software Standards

The Washington State Department of Transportation defines standards for common applications or programs used on each personal computer at the Washington State Department of Transportation. This standard, known as the Level Playing Field or LPF, is the environment in which end-user components of the Revenue Collection System shall reside.

### Client/Server WSDOT LPF Software

Basic Office Business Functions	Software and Version
Word Processing	Word 6.0, 7.0 & 2000
Spreadsheets	Excel 6.0, 7.0 & 2000
E-Mail	Exchange 4.x & Outlook 2000
Out Going Fax	FaxSr Server 3.1
Meeting Scheduler	Schedule Plus (Exchange 4.x); Outlook 2000
Basic Graphics Presentations	PowerPoint 6.0, 7.0 & 2000
Mainframe Access	Attachmate Extra 6.4
Electronic Forms	Filemaker Pro 4.x & 5.x; Exchange 4.x
Internet Web Browsers	IE 5.5
Software Distribution/Remote Support	Microsoft SMS 2.0
Anit-Virus	McAfee Virus Scan 4.5
Disk Optimizing	DisKeeper 6.0
Public Information Exchange on the WWW Server	Adobe Acrobat Reader 4.05C
Client Operating Systems	Windows 'NT 4.x SP 6 & 2000,
Server Operating Systems	Windows 'NT 4.x SP 6, 2000 & XP
Network Protocol	Microsoft TCP/IP
File Compression Utilities	WinZip 8; Raster; PKZip
Engineering Aids	Microstation, CaiCE
GIS	ArcView 3.1 & 8.02, ArcSDE, ArcIMS
Charting, Process, Work Flow and Org Chart	Visio Pro 2000
Project Management	MS Project 4.x & 2000; Sector PS/8
Dial-in Services	MS RAS Client; Terminal Client Services (2000, XP)
Enterprise Development	Power Builder 6.5; C++ 4.1; Visual Basic 5.0; MS Office '95 w/ODBC; Cold Fusion 4.0; InterDev; UltraDev; Dreamweaver
Enterprise Database	MS SQL 7.0 & 2000
Local Database	Access 7.0 & 2000; FileMaker Pro 4.0 & 5
HTML Editors	Word Internet Assistant; FrontPage 98 & 2000; Homesite 3.0; Cold Fusion; DreamWeaver

Basic Office Business Functions	Software and Version
PDF	Adobe Acrobat Exchange/Reader 5.0
PDA Operating Systems	Windows 'CE
Collaborative Document Sharing	NetMeeting 2.0
Server Backup	ArcServe & FDR Upstream

## Mainframe/Middleware WSDOT LPF Software

Vendor	Software and Version
IBM	OS/390 Operating System V2.4
IBM	3270 PC File Transfer Program V2.4
IBM	DFSMS V2.4
IBM	TCP/IP Base V3.2
IBM	TSO/E V2.4
IBM	CICS V4.1
Allen System Group	JCLPrep R 4.1.0
BMC	CMF Monitor for OS390 V5.3.1
BMC	MainView for CICS V5.3.01
BMC	MainView for OS390 V2.5.1
BMC	Resolve (SYSPROG) V3.2.00
Candle Corporation	CL/Supersession V147+PTF's
Computer Assoc.	ACF2/MVS R6.2 GL9712
Computer Assoc.	ACF2/CICS Interface R6.2 GL9712
Computer Assoc.	APAS/Insight R3.5.1
Computer Assoc.	PLEU R3.5.1
Computer Assoc.	CA-1 (TMS) R5.2 GL9910
Computer Assoc.	CA90s Services R1.0 GL9901
Computer Assoc.	Easy Proclib V2.2 GL9412
Computer Assoc.	ENAT R2.2.1
Computer Assoc.	Endevor R3.8 GL9908
Computer Assoc.	JCLCheck R7.0 GL9905
Computer Assoc.	MIM V4.4 GL9905
Computer Assoc.	Netman R4.9 SP08
Computer Assoc.	Netman/OLCF R4.9 SP08
Computer Assoc.	Netspy V5.2.2
Computer Assoc.	TSOMON R6.1.2 GL9906
Compuware	Abendaaid MVS R8.4.3
Compuware	Fileaid R8.0.1
Compuware	Shared Services R7.4

Vendor	Software and Version	
Compuware	Xpediter/CICS	R7.0
Compuware	Xpediter/TSO	R6.4
Fischer Innis Systems	IOF	R7.E
Informatica / Striva	DETAIL	V3.0.0
Levi, Ray and Shoup	VPS	V7.0.60
MacKinney Systems	CICS CEMT	R5.1
MacKinney Systems	CICS Message	R2.4
MacKinney Systems	CICS QSORT	R4.2
Princeton Software	HourGlass 2000	V4.1
BMC	Control-M	V5.0.4
BMC	IOA	V5.0.4
Princeton Software	Version Merger	V5.0
SAS Institute	SAS/Base	V6.0.9E TS465
SAS Institute	SAS/ETS	V6.0.9E TS465
SAS Institute	SAS/Graph	V6.0.9E TS465
SAS Institute	SAS/Stat	V6.0.9E TS465
Software AG	Adabas	V7.1.2
Software AG	Basic/Online Services	V7.1.2
Software AG	Construct	V3.4
Software AG	EntireX	V5.3.1.4
Software AG	Native SQL	V1.7.2
Software AG	Natural	V3.1.3
Software AG	Natural Security	V3.1.3
Software AG	Natural VSAM	V2.4.5
Software AG	Predict	V3.4.2
Software AG	Supernatural	V3.2.1
SPSS Inc	SPSS-X	V4.1
Sterling Software	Vision:Builder	R13.0
Sterling Software	Vision:Doc	R3.2T
Sterling Software	Vision:Results	R4.0
Sterling Software	Vision:Sixty	R10
Syncsort Inc	SyncSort	R3.6E PTF5

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<sup>i</sup> The Colman dock passenger level may be converted to turnstiles during step one due to an existing adaptable facility

